

PROCEEDINGS OF THE NATIONAL SEMINAR
ON
**ROLE OF SCIENCE AND TECHNOLOGY
IN UPLIFTMENT OF TRIBALS**

2ND MAY, 2018



Organised by

**Department of Indigenous Knowledge, Science and Technology &
Department of Comparative Indic Studies and Tribal Sciences**

School of Natural Science and Technology
Kalinga Institute of Social Sciences (KISS)
Deemed to be University, Bhubaneswar-24

Proceedings of the National Seminar on ROLE OF SCIENCE AND TECHNOLOGY IN UPLIFTMENT OF TRIBALS

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Kalinga Institute of Social Sciences
(Deemed to be University)

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KALINGA INSTITUTE OF SOCIAL SCIENCES (KISS)

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Prof. Achyuta Samanta

Hon'ble Founder, KIIT & KISS

Message

Kalinga Institute of Social Sciences (KISS), a globally recognized Institute, exclusively for tribal children, fully free and fully residential, was established in 1993 with an aim to eradicate poverty through education of the most vulnerable tribal communities of Odisha and adjoining States of the Country. At present, the Institute is having 37,000 indigenous students that include 27,000 current students and over 12,000 alumni. The Institution has earned world-wide reputation because of its excellence in teaching, sports and skill education for which it has been conferred Special Consultative Status by United Nations with Economic and Social Council (ECOSOC) since 2015 along with so many other laurels and accolades including a number of Guinness Book of records in various extension activities.

Because of its outstanding contributions in the field of education, empowerment of the poor, alleviation of poverty and social transformation; KISS has been granted “Deemed to be University” status by the Ministry of Human Resource Development (MHRD), Govt. of India in the year 2017 to focus on teaching and research in unique and emerging areas of knowledge related to Tribal Culture, Philosophy and Heritage, Tribal Linguistics and Literature, Tribal Science and Technology, Tribal Resource Management, Tribal Legal Studies and Tribal Rights.

I am delighted to learn that the Department of Indigenous Knowledge, Science & Technology (IKS), under the School of Natural Science and Tribal Technology, belonging to Science Stream is doing a lot of works in respect of study and research on tribal culture, philosophy and Eco-spiritualism. As a part of their work, the department has organized a National Seminar in our University on “**Role of Science and Technology in Upliftment of Tribals**” on 2nd May, 2018. Several scholars and experts were invited to make their presentations on the concerned topic and offer their views and suggestions for the preservation and promotion of the Culture, heritage and philosophy of the Primitive Tribes of Odisha. The concerned Department is going to bring out the proceedings of the said National Seminar by incorporating all these valuable presentations and observations. I hope, the publication of the Proceedings will be of a great help for all the Scholars, Policy-makers and Common Readers interested in the concerned emerging areas of knowledge.

Wish the Publication a grand success.

Achyuta Samanta



KALINGA INSTITUTE OF SOCIAL SCIENCES (KISS)

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Prof. Harekrishna Satapathy

Vice-Chancellor

KISS Deemed University

Foreward

Kalinga Institute of Social Sciences (KISS) Deemed University has been striving hard to promote study and research on various aspects and dimensions of tribal society and culture from the day of its inception through teaching, research, seminars, symposia, conclaves, exhibition, field work, cultural programmes and other extension activities. Out of the seven generic departments completely dedicated to the study and research on various aspects of tribal culture and philosophy; tribal language and literature; tribal law and rights; tribal marketing and management; the department of Tribal Resource Management has been focusing on various tribal resources, including forests and forest products; mines and minerals; agriculture and agricultural products and water resources etc. and their preservation and protection, proper utilization and their systematic management and marketing for the sustainable development of the tribals of the concerned areas.

In this context, the concerned department organized a National Seminar on “**Role of Science and Technology in Upliftment of Tribals**” on 2nd May, 2018 in the premises of our University and a number of scholars and policy makers were invited to present and deliberate upon the topic. Most of the experts have presented a number of learned research papers on the concerned topic in the said Seminar.

It is delighted to note that the concerned department is going to publish the Proceedings of the said National Seminar consisting of all these selected Research Papers and the observations of the eminent Policy makers. It goes without saying that the Publication will be extremely useful for the scholars, Readers and Researchers interested in the concerned emerging areas of knowledge related to the socio-cultural development of various tribes of the Country in general and Odisha in particular.

May I avail this opportunity to thank the Editor of the Proceedings, Dr. Rashmi Mohapatra, the Associate Dean of the School of Natural Science & Tribal Technology, under which the department of Indigenous Knowledge, Science & Technology is functioning smoothly and her entire team for bringing out this precious publication. Also I take this opportunity to express my gratitude to all the Contributors of the Papers for enhancing the quality of the Proceedings by their research findings, enshrined in their erudite presentations.

We are always grateful to our Hon’ble Founder, **Prof. (Dr.) Achyuta Samanta** for his timely guidance and unflinching patronization and blessings for the success of our academic research activities.

Hope, the Department will continue to exhibit its commitment to bring out many more useful publications in days to come in order to ensure an appropriate place for the University in the world map of tribal studies and research.

Harekrishna Satapathy

**A Report on
One Day National Seminar, "Role of Science and Technology in the
Upliftment of Tribals" conducted by School of Natural Sciences and
Tribal Technology,
02 May, 2018**

INAUGURAL SESSION

The inaugural session started at 9.30 am after lighting of the holy lamp by the invited guests. Prof. B.N Ray, Director, Research welcomed all the guests and briefly explained about the purpose of the seminar. Then the Guest of Honour, Prof. Asoka Ku. Das, former Vice Chancellor, Utkal University inaugurated the seminar and delivered his inaugural lecture on the theme.

Two speakers were invited to speak in the inaugural session. The first speaker, Prof. Sanghamitra Pati, Director, Regional Medical Research Centre (RMRC), Bhubaneswar, delivered a talk on "Maternal and Child Health Issue in Tribal Community". In her lecture she spoke on maternal and child health, malnutrition, environmental measures to control diseases, Maa-Griha (Maternal Health Care Centres) and documentation on healing systems of the tribals.

The second speaker Dr. Saroj Swain, Principal Scientist, Central Institute of Fresh Water Aqua Culture (CIFA), Bhubaneswar delivered a lecture on "Ornamental Fish Farming for Livelihood Security". He elaborated on different varieties of ornamental fish, how to culture them and how pisciculture can be used as a means of livelihood by the tribals.

Presidential address was given by **Prof. Harekrishna Satapathy, Vice Chancellor, KISS University**. He highlighted about the types of tribal, their culture, tradition and described the various ways of preservation and conservation of tribal culture and art by documentation and digitization. Prof. Satapathy discussed about ethno medicinal use of different plants and shared his experiences on different herbal products having medicinal value.

At the end of the Inaugural session, Mr. Julioius Lakra, Registrar KISS proposed his vote of thanks.

TECHNICAL SESSION-I

After the completion of inaugural session the Academic Session I started at 11.15 A.M. Prof. B.N Ray, Director Research, conducted the proceedings of the Session as chairperson. Two speakers from reputed scientific organizations were invited to speak on the theme of the first session as discussants.

The first speaker Dr. Soma Chattopadhyay, Principal Scientist, Institute of Life Sciences (ILS), Bhubaneswar spoke on "Issues of Infectious Diseases in Tribal Life". She gave examples from her

life experiences in the village areas. The second speaker, Prof. Budhadev Mishra, ex-Assistant Commissioner, Krishi Bhawan, New Delhi presented spoke on "Agriculture and Tribal Life". He correlated the health status of tribal community with the general population with respect to the use of chemical pesticide related health hazards.

TECHNICAL SESSION-II

The Academic Session II started at 2.30 PM. Three speakers were invited to speak on the theme of the session as discussants. Dr. Devi Priyadarshini, Scientist, Regional Museum of Natural History, gave a talk on "Role of Science and Technology; Need for Holistic Conservation". She specifically emphasized on the conservation of birds and animals closely associated with tribal life.

The second speaker, Dr. Kajal Parasar, Associate Professor, Department of Applied Physics, KIIT University, Bhubaneswar explained about various scientific models and their application in everyday life. The Third speaker, Dr. Manish Kumar, CSIR, IMMT, Bhubaneswar emphasized upon the role of industries in the development of tribals. He focused on the use of varieties of water filters for tribal welfare.

VALEDICTORY SESSION

The Valedictory session started at 4.30 PM. The chief guest Prof. B.C Guru, KIIT University Bhubaneswar delivered the Valedictory address. He gave importance on the preservation of tribal culture and tradition. Prof. Guru related mythology, religion and science for the upliftment of tribals. Prof. Harekrishna Satapathy, Vice Chancellor of KISS University in his concluding remarks stressed on conservation of sensitive areas for the preservation of tribal culture. Specifically he emphasized on the conservation of the tribal culture by the interference of scientists.

Besides that in both the sessions faculties of KISS University presented a few papers covering different areas such as tribal art and craft, festival, life style, health issues, mathematical and scientific applications for upliftment of tribals, impact of industrialization on tribal society, impact of gems on tribal community and the like.

In the end, Dr. Rashmi Mohapatra, Associate Dean, School of Natural Sciences and Tribal Technology and Convenor of the seminar proposed vote of thanks to all the invited dignitaries such as Prof. B. C. Guru, Prof Asoka Ku. Das and other invited speakers and guests. She also extended her thanks to all faculties and student participants as the seminar was a grand success as per the plan.

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ORNAMENTAL FISH FARMING AS LIVELIHOOD OPTION FOR TRIBAL PEOPLE

Saroj Kumar Swain, Sunil Ail and Mukesh Kumar Bairwa

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INTRODUCTION

Ornamental fish keeping is one of the most popular hobbies in the world today with the growing interest in aquarium fishes has resulted in steady increase in aquarium fish trade globally. Ornamental fish production is one of the upcoming sectors growing at an annual rate of 14%. About 300 exotic species and more than 100 indigenous species of ornamental fish are being produced and traded. India's share in ornamental fish export is only 1% of the total traded value of 6 billion US\$ per annum. Tremendous scope and potential exists for production and domestic trade as well as export of ornamental fish. Efforts are made to develop ornamental fishery in India and some of the success stories proved that the technology has been able to provide livelihood to many, who are sincerely engaged with utmost devotion. Therefore keeping ornamental fishes not only provides an aesthetic pleasure but also provides for financial openings for many.

Among the freshwater candidates, the dominating species are guppy, platy, swordtail, molly among livebearers and among egg layers, there are several species like Angel, Discus, tetra, gold fish, Koi carp, Gourami etc. are in the trade. By keeping the view on profitability and easy adoptability, several work programmes have been undertaken by ICAR-CIFA to enhance the livelihood of rural poor in many backward districts of Odisha under the project mode. Two major successes have been focused in this article. Also the paper reviews the development of the breeding technology of the ornamental fishes in India for livelihood security.

ASPECTS OF THE ORNAMENTAL FISH BREEDING TECHNOLOGY

The breeding technology involves both science and

art with high degree of skill for successful operations. The technology gets refined at the entrepreneurs level with experience and expertise as fine skills are learned when practiced hands on. The research institutes have committed to give attentions to develop these technologies and the National Fisheries Development Board (NFDB) also have provisions for supporting enterprises in ornamental fish culture and trade.

Below are few essential aspects of the ornamental fish breeding as tips to the entrepreneurs interested in the breeding.

(i) Sexing the fish

Determining the sex of a fish is an important aspect. Most fish can be classified as sexually dimorphic or sexually isomorphic. In sexually dimorphic species, the sexes can be easily distinguished by size, shape, colour and fin pattern. Such as all other animals of animal kingdom males are more colorful, larger, and have more elaborate finnage. Several dimorphism is maintained brilliantly in the male cichlids, killifishes, barbs and Livebearers. In sexually isomorphic species, such as angel fish, it is generally difficult to identify sexual differences. But an experienced aquarist can identify the sex by virtue of experience or working with that particular fish for a long time. Often, the only way to distinguish between the sexes is the shape of the genital papilla, which is only visible during spawning period. In some isomorphic species, the males are slightly larger and the females are more oval in mid-body shape.

(ii) Selection of brooder

Once the sexes have been distinguished, a suitable pair or spawning group can be selected. There are several important traits to seek in choosing the brood fish. The fish that shows good markings and colour

that would produce attractive young should be selected. It is better to use mature, healthy fish for spawning because unhealthy fish, if they spawn, may produce unhealthy or deformed hatchlings. It is to be ensured that the pair is well compatible. Many species cannot be put together in a breeding tank and expected to get along and produce young. In many cichlids, pairs form only after a group has been raised together for months. In certain species such as gouramies, during spawning process, if the male is ready and female is not, in that case male may kill the female. This may be due to incompatibility among the sexes. The crossing between the different strains or color forms should be avoided because the progeny may be unattractive. It should always be ensured that the pairs are from the same species as usually hybrids are sterile.

(iii) Conditioning the brooders

Before placing the parent fish together for spawning, they should be conditioned through best feeding strategies with a variety of live foods to get them in excellent matured condition for spawning. The livefood such as *tubifex*, bloodworm and zooplanktons lead to the good growth, colour and spawning.

BREEDING STRATEGIES AND SPAWNING ENVIRONMENT

Some of the ornamental fish species readily spawn in the aquarium or cement tanks, the eggs or hatchlings often do not survive because of predatory nature of the parents. Sometimes the mortality occurs due to unfavorable or polluted water conditions. It is always better to breed the fish in a separate spawning tank. Depending on the spawning method, the spawning tank can be set up in a number of different ways based on the spawning behaviour of the fish.

A. Ovo-viviparous (Livebearers)

Livebearers are fish that bear live young. They are ovoviviparous in nature, where the eggs form and hatch within the female before birth. Livebearers are often prolific, easily bred species. Breeding of most of the livebearers is relatively easy. They are mostly molly, platy, swordtail, platy and their variants. Development of young ones takes place inside the female body and they are released after about four weeks. The species of livebearers include the guppy

(*Poecilia reticulata*), black molly (*Poecilia sphenops*), swordtail (*Xiphophorus helleri*) and platy (*X. maculatus*). The number of youngones produced by a livebearer is normally 50-60 only, though some larger swordtails and guppies may produce between 80- 100 nos. Soon after the youngones comes out from the mother, they have to be separated out to reduce mortality caused by predation. Small livebearers can be bred in breeding traps where the newborn come out of the reach of the brood mother. However, a more traditionally preferable set-up is a separate, densely planted tank where only gravid females are kept. As the young ones are visible in the top of water surface, they are to be removed and fed the powdered feed and zooplankton. As soon as all the young are born, the mother is to be removed and fed suitably.

B. Oviparous (egg layers)

Most of the aquarium fish are egg-layers with external fertilization. Egg-layers can be divided into five groups' viz., egg-scatterers, egg-depositors, egg-burriers, mouth-brooders, and nest-builders.

(i) **Egg-scatterers:** Zebra fish (*Zebra danio*) which is considered as an egg scatterer, lays non-adhesive eggs. The larger ones are grouped under the genus *Danio* and other smaller varieties are under genus *Brachidanio*. The important varieties of danios include the giant danio (*Danio aequipinnatus*), pearl danio (*Brachidanio albalineatus*) and zebra danio (*Brachidanio rario*). Since the egg scatterers and often drives the egg do not show parental care and eat their own eggs, the spawning tank has to be set in such a way that the eggs fall out of the reach of spawning parents.

For breeding such fishes the male and female ratio should be maintained at 1:1 or 2:1. 40-50 l capacity tank is sufficient for spawning for most eggs scatterers. The brood fishes are kept in a mesh net happa from where the eggs drop to the bottom. If the temperature is favourable, the eggs require two-three days hatching time. As soon as the tiny hatchlings are seen in the aquarium tanks the parents are to be removed. The hatchlings take 2-3 days to absorb their yellow yolk sac. Then they are fed with infusorians for 4 days followed by rotifers and smaller zooplanktons for a week, after which they can be provided powdered formulated feed along with zooplankton.

The egg scatterers laying adhesive eggs are mostly the Gold fishes, *Carassius auratus*. When secondary sexual characters appears (by observing the maturity condition), the male and female gold fish are selected and kept in glass tanks or ferro-cement tanks. Since gold fish eggs are sticky in nature, they require some surface for adhesion. With various types of natural submerged aquatic plants such as *Hydrilla* can be used after treatment for this purpose. Artificial nests also can be prepared by making split plastic ropes with one end tied or burnt to make it blunt. Even a bunch of polythene strips have been found suitable for the purpose.

The female and male in the ratio of 1:2 are released into breeding tank during late evening hour. The male chases the female, presses its operculum against female's abdomen and fertilizes the eggs while swimming beside her. Egg laying usually takes place within 6-12 hrs of releasing the broods. After spawning the nest is transferred to a different container, or alternatively, the parent fish transferred from the breeding tank. If this is not done, the parents are most likely to eat away the eggs to compensate the post-spawning loss of energy.

Generally, the female lays about 2000-3000 eggs. Healthy eggs are golden transparent in colour and the unfertilized eggs will remain opaque and continue to remain as such with arrested growth. These dead eggs become pale white and hairy. Under ideal condition, within three days, the eggs hatch out with a hatching rate of 80-90% when the young larvae start to adhere in the sidewalls initially till yolk sac absorption. After hatching of eggs, the nest materials are taken out from the tank. Sometimes, the tiny hatchlings remain clinging to the nest, so precaution has to be taken while transferring the nest from the breeding pool.

(ii) Egg-depositors

These species deposit their eggs on a substrate (tank glass, wood, rocks and plants). Egg depositors usually lay less eggs than egg-scatterers, and the eggs are larger. Depending on the type of egg depositor, the tank should be furnished differently. For those egg-depositors that care for their young, the parents can be retained in the tank after spawning.

Substrate spawners, depending on the species, should be given a tank furnished with glass panes, broad-leafed plants, or flat stones for spawning sites. Some

species such as Discus and Angelfish prefer vertical surfaces. From a group of such fishes a pair is selected by providing a slanting serrated glass surface plate, where a suitable pair comes near the plate for cleaning the surface for laying eggs. At that time, the pair is carefully removed for further breeding in a separate tank. For cavity spawners such as *Badis badis*, Chameleon fish, flower pots turned on their side, coconut shells, and rocky caves are suitable spawning sites. The tank should be furnished with either live or plastic plants to give the fish a sense of security.

Egg-depositors that do not care for their young should be given a tank furnished with fine and broad-leafed plants. After spawning the parents or plants with the eggs are to be removed. Rasboras prefers peace and quiet environment for breeding with low lighting conditions. The male and female brooders are placed together in breeding tank. Once spawning has occurred, as indicated by the slimness of the female fish, both parents from the breeding tank need to be removed. The eggs laid on the underside of the flat levels will hatch after 25-30 hours. Generally from a larger female up to 250 eggs are produced and resultant hatchlings become free swimming after 3-4 days. At this stage the tiny hatchlings should be fed infusorians and newly hatched brine shrimp. As they grow bigger they should be fed zooplankton. They can also be bred by another method by putting the gravid brood fish in a mesh net through which eggs are dropped to the bottom and hatching takes place.

(iii) Egg-burriers

These species usually inhabit waters that dry up at some time of the year. The majority of egg burriers are Killifish which lay their eggs in mud. The mature parents lay their eggs before dying when the water dries up. The eggs remain in a dormant state until the fresh rains which stimulate hatching. These fishes are *Aplocheilius lineatus*, *A. panchax*, *A. dayi* and *A. parvus*. Some breeders prefer a peat-moss substrate for egg-burying species. In order to initiate hatching, the stored peat can be immersed in soft water.

(iv) Nest-builders:

Nest builders build the nest for their eggs. The nest is usually in the form of bubble-nest formed with

plant debris and saliva-coated bubbles (labyrinth fish), or an excavated pit in the substrate (cichlids). Nest builders practice brood care. Therefore, they should be provided with a wide leafy material with which to build their nests and the tank should have no water current to disturb the nest. Good nest builders are Gouramies (Blue/golden gourami-*Trichogaster trichopterus*), (Dwarf gourami-*Trichogaster lalia*), (Giant gourami- *T. fasciata*) and fighter fish (*Betta splendens*).

For breeding such fishes the sexes are kept separately for few weeks. As the abdomen of female becomes grossly distended with eggs it is transferred to a smaller breeding tank containing few floating plants with water level of 5-6" at a temperature of 28-30°C. After one or two days a good male is introduced in the breeding tank. A transparent perforated plastic sheet or a glass is covered over the tank to maintain the humidity and temperature at high level which helps to maintain the bubble nest in good condition. The male soon begins building a bubble nest. This is possible by taking a large gulp of air at the water surface and converting it into many smaller bubbles that are passed into gill chamber and coated with an anti-burst agent before release. During and after making the nest, the male displays to the female which usually ends with both fish embracing near the nest resulting in the deposition of a large numbers of eggs in the nest. After making the bubble nest if the female do not lay eggs then the male become very aggressive and may kill the female. After breeding, the female is removed. The male guards the eggs which remain attached to the floating bubble nest. Within 24 hours, hatching takes place. The moment, the fry begin leaving the nest, the male is also removed from the tank. After 36 hours, the young ones remain in free swimming stage, they are provided with infusorians as starter feed. After a week the fry starts taking small zooplanktons. During this stage the fry require vigorous feeding. Subsequently when they grow little bigger they can be stocked in larger cement tanks for further growth.

(v) Mouth-brooders:

These are species that carry their eggs or larvae in their mouth. Mouth brooders can be divided into ovophile and larvophiles groups. Ovophile or egg-loving mouth-brooders lay their eggs in a pit, which are sucked up into the mouth of the female. The small

number of large eggs hatches in the mother's mouth, and the fry remain there for a period of time. Fertilization often occurs with the help of egg-spots, which are colorful spots on the anal fin of the male. When the female sees these spots, she tries to pick up the egg-spots, but instead gets a mouthful of sperm, fertilizing the eggs in her mouth. Many cichlids and some labyrinth fish are ovophile mouth brooders.

Larvophiles or larvae-loving mouth-brooders lay their eggs on a substrate and guard them until the eggs hatch. After hatching, the female picks up the fry and keeps them in her mouth. When the fry can fend for themselves, they are released. Ovophile mouth-brooders can be bred in the main aquarium because the eggs are protected in the mouth cavity. However, it is better to separate mouth-brooders with eggs because of their potentially aggressive behavior. There are no special breeding tank requirements other than the usual tank set-up for the species. Larvophile mouth-brooders should be placed in a breeding tank because the eggs are not protected in the mouth, but laid on a surface where they are open to predators. For mouth brooders, open cement cisterns of 2 feet water depth with planted long leafed plants are generally used for commercial production.

ASPECTS OF SUCCESSFUL PRODUCTION

"The success of any entrepreneurs depends upon the project planning, site selection, successful layout and design of the breeding or rearing unit. Once the unit is established in any site and later on found uneconomical due to unavailability of certain important facilities such as water and power. Beatification will be difficult. Therefore, proper planning is required. At present the variety of commercial enterprises producing ornamental fishes is varied and diverse as the species produced. The degree of intensification and species farmed depends on following aspects.

- Training on the subject is a prerequisite before starting an ornamental fish unit
- The minimum land requirement is 500-1000 square feet area for a small scale farming practice, whereas 1 acre and more for large scale farming in which few earthen ponds are to be excavated for some species such as koi carps, gourami, and barbs ..

- Site selection is one of the main criteria where the farmer should select a cool environment for the culture and breeding.
- Breeding and rearing unit should be made near a constant supply of clear water source and with electricity.
- In cold climates farming is too expensive as the water has to be kept warm to culture tropical fish. The tropical climates favour the production rate because of year round breeding, probability as successful rearing and better growth. So the entrepreneur has to select the species accordingly.
- The selection of candidate species depends also on the water quality of that area. Because there are species which prefers either soft water or hard water for breeding at the same time. There are species that are tolerant to a wide range of water conditions. For example all the live bearers prefer hard water- alkaline. Egg layers such as goldfish, gourami, danio, catfish, rosy barb and fighter etc. can tolerate wide range of water condition. Species such as angel, discus, tetras, oscar, loach prefers soft -acidic water. Therefore, water quality need to be checked.
- In certain areas, some species are difficult to breed, where there is a severe problem of water quality due to physico-chemical factors. Therefore, site selection for establishing ornamental fish farms is important.
- Biofiltration unit is a prerequisite for smooth functioning of an ornamental fish culture and breeding unit.
- The brood stock selected for breeding should be of superior quality, so that good quality fish seed could be produced. If brood stocks are not available in an area, one can think of rearing healthy smaller fish in to brood stock.
- Brood stocks can be allowed to breed for not more than two years. Fresh stocks from different source may be added in every two years to the selected parent stocks to improve the breeding efficiency and produce healthy offspring.
- The small fish breeder should concentrate preferably on one species so that it helps the breeder to develop expertise on the particular species and good quality fishes can be produced as per the market demand.
- The availability of agro-based byproducts facilitates the preparation of pelleted diet for the fish. For preparing a pelleted diet, a mini pelletiser may be a requirement.
- The breeding and rearing unit may be established preferably nearer to an airport/ railway station, bus stand etc. for easy transportation for export and domestic market.
- The breeders should develop market relations with pet/ retail shops, potential farmers, vendors dealing with ornamental fish, marketing network, etc. to facilitate the process of selling/ procuring new brood stocks.
- A committed entrepreneur should always ensure regular contact with the recent research developments in the field and attend training and exposure visits.
- All new incoming fishes should be quarantined from resident stock. Movement of fishes should be restricted from a suspected or unknown disease status area.
- Few quarantine tanks are required little away from the unit so that proper observations can be made on health aspects.
- If any abnormal behaviour is observed in any culture tanks then the fishes needs to be isolated immediately. If mass mortality occurs, express opinion has to be sought as the lead fish as well as equipments water be dispersed.

CIFA- The gateway of ornamental fisheries

Central Institute of Freshwater Aquaculture (CIFA) Bhubaneswar has successfully bred and standardized the successful rearing of 16 indigenous ornamental species from NEH, Eastern and Southern Western ghat region. They are barbs, danios, rasboras, catfish, eel, black carp and chameleon fish. Recent achievement of captive breeding technology of an endangered fish *Dawkinsia tamraparnei* has been successful at CIFA leading to commercial production. Development of "Shining barb" through selection process is one of the major achievements of CIFA. Development of CIFACURE, a medicine has been commercialised for controlling fungal and bacterial diseases. CIFA is playing major role for

conducting research and training programmes on freshwater ornamental fish breeding and culture in the country by conducting several national level training programmes both in and off-campus comprising more than 5000 participants from all over the country over a period of two decades. Several farmers and entrepreneurs have visited ornamental fish unit under exposure programmes.

Institute has also made a documentary film on 'Ornamental fish breeding and culture' with the collaboration with SAARC Agricultural Information Centre (SAIC), Dhaka, Bangladesh for SAARC member countries. CIFA has also given the technical input for making two documentary films by UNDP and GRAMSAT. Odisha based local television channels and All India Radio also popularizing the sector with the help of CIFA.

As regard the North-Eastern region, the Institutes regularly conduct the training programmes as also awareness programmes to conserve and breed the important ornamental fish species. To popularize ornamental fishes in the North East region Four (4) demonstration portable breeding units have been established at Killing, Meghalaya; Itanagar, Arunachal Pradesh; State Fisheries Department, Dimapur, Nagaland and Ecology and Environmental Science Department, Assam University, Silchar. Few progressive farmers of Assam are engaged in ornamental fish production after undergone training at the Institute.

LIVELIHOOD PROGRAMME FOR INCOME GENERATION

The NAIP programme (2009-14) was implemented in three districts of Odisha such as Keonjhar, Sambalpur and Mayurbhanj on a backyard concept by main streaming women self help groups to technologies of ornamental fish production for skill development and better income. The main objective under this programme is to enhance the livelihood of farm families through ornamental fish farming by skill building, SHG formation for empowerment and gender participation to bring rural women to mainstream activities in such farming practice. The programme is focused to engage and empower the landless or marginal women farmers through ornamental fish farming for income generation in SHG and individual mode too.

The Strategies adopted were awareness, skill building through training, exposure visits, handholding of the farmers, free input provisioning, hatchery establishment, guidance and technical support with market linkage to the farmers in the remote tribal areas. The innovativeness was to establishment of low cost hatcheries under Public Private Partnership mode (PPP) in tribal areas to retain the ownership as a way of sustainability of such farming system even after the project period. For this purpose CIFA has designed and established a new FRP Hatchery for small scale production developed for smooth operation by the tribal women.

a. Initiation of the work:

The efforts of NAIP-CIFA have catalysed the members of SHG to establish 30 ornamental units in 3 districts of Odisha. About 900 women farmers were exposed to ornamental fish breeding and culture as a new venture in rural tribal areas number of village level training programmes and exposure visits. Emphasis were given on every aspect from initial preparations to marketing of the produce. To make them involved and ownership feeling, under PPP mode the self-help groups and individual farmers were advised to construct a cement platform of 7.5 x 5 m and 6-8 tanks each of 1.5 x 1 x 0.6 m. NAIP-CIFA provided eight rectangular FRP tanks of 450 l capacity and a circular hatchery for breeding of livebearers and some of the egg layers. When the full unit was ready, livebearers fish and feeds were provided to them by the project. Provision of inputs like shade net and all the accessories like fish catching nets, plankton catching net, sieves for grading the planktons and feed, flexible pipes for siphoning purpose, plastic wares such as mugs, buckets, feed containers etc were provided to all the farmers. Infusorians and chopped earthworms are used as protein rich live food in larval rearing and carp floating pellets are used for grow out culture. For acquiring hands - on - experience of rearing, the farmers were provided with 500-600 numbers of livebearers. Breeding of livebearers were demonstrated in the presence of all the members in all the units. The women Self Help group members were happy to involve themselves after completion of their day to day household works.

b. Interests of the SHG members:

After selling of the ornamental fishes and earning the interests of the group members have increased. They

also have the feeling of self contentment and express satisfactory views and also have developed much positive eagerness for expanding the unit. As compared to before they are now more much more experienced and are now trying the best to produce more quality fishes which can further fetch high values in the market.

c. The outcomes in terms of benefit:

1. Unskilled women are developed as skilled farmers through capacity building during intervention.
2. 20 women SHGs are developed through ornamental fish culture empowering more than 203 women belonging to SC &ST and OBC community.
3. 30 production units are established under women SHG / individual in rural areas
4. The intervention has spread out effect to the adjacent villages and nearby districts, where new women farmers are adopting the technology.
5. The technology has created additional employment of 30 man days by utilizing their leisure times in two cycles of production of livebearers and their average income level has been enhanced by Rs 60,000/unit under SHG mode.
6. The Nutrient rich waste water from fish tanks are used for horticulture and vermin-compost under integration mode.

d. Establishment of ornamental fish village in Odisha:

With the concept of to improve the livelihood of the rural women and self-help groups, initially few farmers were motivated in production of ornamental fishes in their backyard by constructing 4-6 concrete rectangular tanks in landijhari village. By seeing the success of NAIP production units at adjacent adopted districts and Landijhari village at Barkote block, with enhanced income, the nearby villagers also showed interest in producing such multicolour species. The cluster approach has created economies of scale and the scope for buyer’s choice through production of different livebearers such as Guppy, Molly, Platy and Swordtail and their beautiful variants. The farmers have adopted the technology by establishing production units at their backyard after an exposure

visit to CIFA and follow up training programmes during 2010. There are 45 rural women involved in ornamental fish farming in Barkote block covering three villages Landijhari, Saruali and Nuagaon in Deogarh district of Odisha. In those villages more than 100 backyard units have been established by the individual farmers. The villagers are able to earn up to Rs10-15 thousand annually from small scale backyard units with an investment of only Rs 3-4 thousands only.

CIFA, State Fishery Department and ATMA provided technical and financial assistance respectively in establishing the production units. The linkage with the traders from Keonjhar and Rourkela for the producing units is established for easy sale of fishes for income generation.

e. Lessons learnt:

The new technology based ornamental fish farming has potential to provide sustainable livelihood for the down trodden women of the tribal community. Through this they have not only learnt the new techniques but also have got a good source of income. The capital generated from this activity enhances the income thereby making themselves employed and providing them a secured financial status. This initiative has helped in reinforcing their economic condition. The technical support for growing other egg layers will help the farmers to get more income in future, which will help in augmenting their income and establishment of production units along with expansion of infrastructure and sustainability.

STEPS REQUIRED TO DEVELOP ORNAMENTAL FISHERIES

- Standardization of breeding technology of important Indian ornamental fishes for conservation and export with the guidelines of Green certification.
- Standardization of high value ornamental fishes within the purview of NBFGR guidelines.
- Breeding and seed production of commercial varieties of important ornamental fish through backyard and entrepreneurial level for domestic trade.
- Standardization of various live food production system and supply is important, hence research and popularization is necessary.

ROLE OF SCIENCE

- Development of a common fish feed for omnivorous fishes, with colour enhancers by enriching natural carotenoids available in our natural resources
- Development of ornamental fish villages in different parts of the country by involving the State Governments and other Stakeholders.
- Development of world class public aquaria's in every state capital especially in major metropolitan cities for the public, students, entrepreneurs and hobbyist for popularization.
- Good quality stocks of important commercial varieties should be available in India for farmers
- Development of large scale hatcheries in every State Fisheries Department for seed distribution for growers.
- Development of a National Centre on ornamental fisheries, attached to any National Institute with a mandate of exclusive research on ornamental fish production.
- Development of trained manpower on breeding and farming practice with a exposure to Asian countries such as Singapore and Malaysia is essential.
- Unemployed youth in general and women in particular are to be encouraged for taking up production and trade in a sustainable basis.

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GENETIC DISORDERS AND BIRTH DEFECTS IN TRIBAL POPULATIONS OF INDIA

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Abstract:

There are about 635 tribal groups and subgroups live in India which includes 75 primitive tribes. Orissa occupies a unique position in the tribal map of India having 62 scheduled tribes including 13 primitive tribes. They form approximately 8 per cent of the total Indian population. Mainly the diseases prevalent in tribal communities of Orissa are communicable, non-communicable and genetic diseases such as sickle cell anemia. Amongst which sickle cell anemia is most prevalent in tribal communities. Several risk factors are accountable for Genetic disorders and birth defects i.e, high consanguineous marriages rate, high fertility, large number of unplanned pregnancies, poor coverage of antenatal care, poor maternal nutritional status, and high carrier rate for hemoglobinopathies. Unless location specific, tribe specific and need-based health care delivery system is evolved the goal of health for all would remain a dream. These systems also need to be appropriate, acceptable, accessible, and affordable. In spite of the tremendous advancement in the field of preventive and curative medicine, the health care delivery services in tribal communities especially in Orissa are still poor and need improvement.

Introduction:

There are about 635 tribal groups and subgroups live in India which includes 75 primitive tribes. Orissa occupies a unique position in the tribal map of India having 62 scheduled tribes including 13 primitive tribes and being home to the second largest population in India. They form approximately 8 per cent of the total Indian population. They are considered as primitive, based on their low level of literacy, diminishing population size, isolation from the main stream, economic and educational backwardness, poverty, dwelling in remote inaccessible hilly terrains and unaware about the ongoing developmental processes. These tribal groups reside in varying ecological and geo-climatic conditions (hilly, forest, desert, etc.) and have adopted different cultural and socio economic habits. Wide spread poverty, illiteracy, malnutrition, lack of safe drinking water and sanitary conditions, poor maternal and child health services, ineffective

coverage of national health and nutritional services, etc. are the major factors for poor health condition in tribal communities of Orissa.

Tribal population has distinctive health problems which are mainly governed by their habitat, difficult terrains and ecologically variable niches as evident from earlier reports. Ignorance, lack of personal hygiene and health education are the main factors responsible for the poor health status of tribals.

Several factors are responsible for high maternal mortality resulting from poor nutritional status, low hemoglobin (anemia), unhygienic and primitive practices for parturition. Average calorie as well as protein consumption is found below the recommended levels specifically for the pregnant and lactating women. Some of the preventable diseases such as tuberculosis, malaria, gastroenteritis, filariasis, measles, tetanus, whooping cough, skin diseases (scabies), etc. are also high among the tribals. Primitive tribal groups

of India have special health problems and genetic abnormalities like sickle cell anemia, G-6-PD red cell enzyme deficiency and sexually transmitted diseases. (Commissioner Report for Scheduled Tribe and Scheduled Caste, 1986-87). Mainly the diseases prevalent in tribal communities of Orissa are communicable, non-communicable and genetic diseases. Infectious and parasitic diseases are very common in tribal areas, which can be prevented with timely intervention, health awareness, Information, Education and Communication (IEC) skilled activities.

Genetic disorders and Birth defects:

Several risk factors are attributed for Genetic disorders and birth defects i.e, high consanguineous marriages rate, high fertility, large number of unplanned pregnancies, poor coverage of antenatal care, poor maternal nutritional status, and high carrier rate for hemoglobinopathies. Seventy percent of birth defects are preventable through the application of various cost effective community services. Many population based strategies such as iodization, double fortification of salt, flour fortification with multivitamins, folic acid supplementation, periconceptional care, prenatal screening have been attempted and have been considered as proven strategies for control of birth defect

Studies carried out on blood groups and immunity related genes have shown that tribals of India have sets of alleles which are limited to certain geography and ethnic groups (Bhatia and Rao, 1986; Das et al., 2005). Based on the studies carried out on haemoglobinopathies, it has been reported that the pattern of distribution and frequency of specific sets of alleles also differ from the non-tribal Indian population (Pande et al 1999 a and b, Murhekar and Murhekar, 2004). The main cause of infant mortality is birth defect (structural, functional, metabolic and genetic disorder) and reducing child mortality and improving maternal health are major challenges in tribal areas. In this review, about Sickle cell disease is elaborated as it is most prevalent in tribal communities.

Sickle Cell disease:

Sickle Cell disease is an inherited disorder and occurs due to replacement of Valine for Glutamic

acid in position 6 of the beta-globin chain of haemoglobin during haemoglobin synthesis. This genetic alteration yields an unstable RBC with a shortened survival of 10-20 days instead of the normal of 120 days. In situations of stress, the red cells become sickle shaped and gets lysed.

Lehman and Cutbush in 1952, first reported about sickle haemoglobin in the tribal populations in the Nilgiri hills of South India. In the same year presence of sickle haemoglobin also reported by Dunlop and Mazumder in tea garden workers of Upper Assam, who were migrant labourers from tribal groups of Bihar and Odisha. Since then, many population groups have been screened and the sickle cell gene has been shown to be prevalent among three socio-economically disadvantaged ethnic groups, the scheduled tribes, scheduled castes and other backward classes in India. But there after data from several investigations unfolds that the disease is not restricted only to tribal belt but is widely prevalent and has penetrated different castes and communities in our country. The highest frequency of sickle cell gene in India is reported in Orissa followed by Assam, MP, UP, Tamilnadu and Gujarat. The average frequency of sickle cell disease in India is 4.3% and that of Orissa is as high as 9.1%.

Sickle cell carrier among different tribal groups varies from 1 to 40 per cent as per earlier reports. In another study from the tribal communities of different states of India it has been reported that the occurrence in Madhya Pradesh has the highest (Kar et al, 2002) and they also reported that in Maharashtra, the sickle gene is widespread in all the eastern districts. The tribal groups with a high prevalence of HbS (20-35 %) has been observed in Bhils, Madias, Pawaras, Pardhans and Otkars. In another study the entire tribal population of 1,25,000 individuals in the Wayanad district of Kerala were screened, in which a very high prevalence of HbS is seen in these tribes (18.2 to 34.1 %).

In Gujarat, the Dhodia, Dubla, Gamit, and Naika tribes have a high prevalence of HbS (13-31 %). Some tribal groups in south Gujarat like Chaudry, Gamit, Rohit, Vasava and Kukana have shown both a high prevalence of HbS (6.3 to 22.7%) as well as β -thalassaemia trait (6.3 to 13.6 %). These

tribal groups would have the likelihood of co-inheriting both these genes. Distribution of HbS in different tribal groups from individual Indian States was studied by Kaur et al.1997. Although a large number of tribal groups have been screened for HbS, there are still many gaps in our knowledge about the distribution of the HbS gene in tribal communities in India.

Frequency of Sickle cell disease in Orissa:

Odisha is home to several ethnic tribal groups with low literacy and limited access to health care organization. Community based interventions necessarily is the key factor in ensuring proper strategies for health management. There are communities who still depend primarily on hunting and food gathering as primary source of livelihood. The wide spread poverty, illiteracy, malnutrition, absence of safe drinking water and sanitary conditions, poor maternal and child health services, ineffective coverage of national health and nutritional services, etc. have been found, as possible contributing factors of dismal health condition prevailing amongst the primitive tribal communities in most of the districts of Odisha. Many of the infectious and parasitic diseases can be prevented with timely intervention, health awareness and IEC activities. Orissa Health Strategy 2003 indicates that the rural population of Odisha and particularly the tribal population, suffer disproportionately from malaria, sexually transmitted diseases, tuberculosis, genetic disorders like G6PD deficiency, sickle cell anemia as also nutritional deficiency diseases. These are some of the special health problems attributed to these communities. The situation analysis of health indices of the tribal population in Orissa are worse than the national average: Infant mortality rate 84.2; under five mortality rate 126.6; children under weight 55.9; anaemia in children 79.8; children with acute respiratory infection 22.4; children with recent diarrhoea 21.1; women with anaemia 64.9 per 1000. A high incidence of malnutrition has also been documented in the tribal dominated districts of Orissa.

Investigators have reported 52% of the SS disease patients within 15 yrs of age (Kar BC, Devi S., 1997). In a study carried out during 2001-2002 in Gajapati

District, in south Orissa has reported the prevalence of sickle cell disorders was found to be 16.55% in under fifteen years children, but significantly high (19.59%) in 5-9 years age group children (Sahu et al 2003). from western Orissa. Anaemia was the most common association and was found in 96.5% of the sickling positive children.

Sickle cell disorders in children are indistinguishable both clinically and haematologically. They run in families and seen in siblings. The children with recurrent episodes of painful attack in abdomen, musculoskeletal pain, fever, splenomegaly, anaemia and epistaxis should be suspected of sickle cell disorders. They should be screened by simple sickling test to identify the genetic disorder.

Parental counselling and preventive measures like penicillin, prophylaxis, regular folate supplementation, early treatment of ARI with simple antibiotics and management of pain with simple analgesics will be helpful in decreasing morbidity and mortality in childhood with sickle cell disease, hence will be promoting normal growth and development in these under privileged children.

Need of the hour:

It is now widely considered that community genetic services for control of birth defects can easily be integrated with primary health care in India as during recent years several government initiatives have resulted in well-established infrastructure and personnel in the area of maternal and child health care. As there are regional variation on the extent and reports for infant mortality rate (IMR) in India, there is a need of deferential approach to implement community genetic services for creating wide spread awareness and advising target groups for addressing preventable genetic disorders, based on a detailed understanding of the issues and trends. This will essentially contribute to a healthy future nation through better management of their health and wellbeing. Despite tremendous advancement in the field of preventive and curative medicine the health care delivery services in rural communities are still poor. This necessitates appropriate strategies and interventions and strengthening public engagements in order to achieve the goal of health for all in the country.

Historically, communities have been the target for interventions in the area of prevention. Many organizations and agencies have focused on risk reduction by working with communities to change the behavior and practices. In the recent years, community engagements in healthcare management systems have focused on significant capacity building efforts. These initiatives have shown varying degree of documented success. Therefore, community-based health interventions are increasingly being recognized as an approach for getting patients voices into the formal health systems, and developing location based intervention strategies for sound and specific management of health issues. Strategies to work with communities could involve strengthening local knowledge to developing partnerships between communities and health care professionals. These are largely dependent on how the community is perceived by the practitioners and how they are integral to the health care systems.

There is an urgent need for initiating the area specific, tribe specific, action oriented health research in consonance with the felt needs of the tribal communities. The research should be mission oriented, having practical applications and directed towards improving the quality of life of tribal people.

Some primitive tribal communities are facing extinction like the Onges, Jarwas and Shompens of Andaman and Nicobar Islands. Some other complications as reported by investigators include (a) Endemic diseases like malaria, tuberculosis, influenza, dysentery, malnutrition, (b) Venereal diseases, induced abortion, inbreeding, addiction to opium, custom of eating tubers of *Dioscorea* (may cause sterility as they contain substances used in oral contraception), and (c) Disturbed sex ratio. Urgent studies are, therefore, required on different primitive tribal groups of India which are small in size. The health and nutrition problems of the vast tribal population of India are as varied as the tribal groups themselves who present a bewildering diversity and variety in their socio-economic, socio-cultural and ecological settings. Nutritional anemia is a major problem for women in India and more so in the rural and tribal belt. This is particularly serious in view of the fact that both rural and tribal

women have heavy workload and anemia has profound effect on psychological and physical health. Anemia lowers resistance to fatigue, affects working capacity under conditions of stress and increases susceptibility to other diseases. Maternal malnutrition is quite common among the tribal women especially those who have many pregnancies too closely spaced. Tribal diets are generally grossly deficient in calcium, vitamin A, vitamin C, riboflavin and animal protein. Child bearing and Maternal Mortality imposes additional health needs and problems on women - physically, psychologically and socially. Maternal mortality was reported to be high among various tribal groups but no exact data could be collected. The major causes of maternal mortality were found to be unhygienic and primitive practices for parturition. For example, it was observed that among Kutia Khondhs the delivery was conducted by the mother herself in a half squatting position holding a rope tied down from the roof of the hut. This helped her in applying pressure to deliver the child. In complicated labour, obviously it might lead to maternal as well as child mortality. Similar crude birth practices were found to exist in other tribal groups like Kharias, Gonds, Santals, KutiaKhondhs of Orissa, Santals, Jaunsaris, Kharias, etc. Expectant mothers to a large extent are ignorant, lack of personal hygiene and health education are the main factors responsible for their ill health.

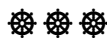
Child bearing imposes additional health needs and problems on women - physically, psychologically and socially. Maternal mortality was reported to be high among various tribal groups but no exact data could be collected. Expectant mothers to a large extent are not inoculated against tetanus from the inception of pregnancy to its termination.

Conclusion: In spite of the tremendous advancement in the field of preventive and curative medicine, the health care delivery services in tribal communities especially in Orissa continues to be poor and need improvement. There is an urgent need to initiate area specific, tribe specific and action oriented research. The research should have practical applications and directed towards improving the quality of life of tribal people. The health, nutrition and medico-genetic problems of

diverse tribal groups are somewhat unique and present a formidable challenge for which appropriate solutions have to be found out by planning and evolving relevant research studies. Unless locality specific, tribe specific and need-based health care delivery system is evolved which is appropriate, acceptable, accessible, and affordable, the goal of health for all would remain a dream. In addition, specific educational programmes those are aimed at influencing behavioural changes need to be initiated at the grassroots level.

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ROLE OF SCIENCE AND TECHNOLOGY IN THE UPLIFTMENT OF TRIBALS

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Introduction:

Nearly 8.10 % (about 104 million people according to the 2011 census) of the total population of India is tribal. Majority of them are in North eastern states, Jharkhand, Odisha, Chhattisgarh, Andhra Pradesh and Andaman & Nicobar Island. Major concentrations of tribal people live in Maharashtra, Odisha and West Bengal. Of all the states of India, Odisha claims to be the second leading tribal state consisting of as many as 62 types of tribals. These tribes are dependent on forest for their day-to-day needs, including food, shelter, fuels, medicine and clothes. No nation can think of development ignoring this size of population and their rich cultural heritage. Independence in 1947 did not bring about any difference in their lives. Instead, because of absence of any monetary funds, these people had to leave their native places in search of work which led to the loss of their rich heritage. Many places are converted into holiday destinations and resorts by contractors who are driving out the tribals and taking away their resources. In this article, their strength and weaknesses have been discussed and the possible solutions have been highlighted.

The strength of Tribes:

The tribal people have various strengths. In every locality, they are rich in culture which includes painting style, dancing forms, handmade things etc

The tribals have access of natural resources in forest including plants and animals. Because of their long association with forest, they have knowledge about the use of different plant products as well as animals and animal products. They include wide varieties of plants products in their daily food consumption. The use of animal products in their food habit is extremely diverse. For example, the people in the forest are very knowledgeable in identifying different edible leafy

vegetables, edible mushrooms and different tubers. Hence, these people have huge traditional knowledge about all the resources of forest. In today's world, where we are looking for diversity in food habits, increasing diversity of micro-organisms in the gut, looking for probiotics, the knowledge of tribal in their extreme diverse food habit is going to lead us in future. Their organic way of growing vegetables and mixed cultivation can be a very good source of knowledge for us.

The tribes live in forest and they solve their all health problems in forest only, using different natural resources. Thus, they have good knowledge on medicinal plants and their use in the treatment of different diseases. In the current disease management system where developing resistance against drugs and getting side effects are the burning problems, exploring the traditional knowledge about medicinal plant would be extremely promising in various localities, geographical locations and climatic conditions.

The bonding among the family members and the bonding among the people living in the same villages is extremely high and this is a real strength for them. In any unfavorable circumstance, they do not hesitate to help and support each other.

One of the most important strength of them is that, they are physically and mentally very strong. They usually stay in isolation without better road, electricity, water supply, health facilities, however they are not scared. In pick summer, chill winter, rainy season, they do not hesitate to work in the field or forest and survive. This shows the mental and physical strength of them. This can actually be channelized in a very productive way by motivating the kids from their childhood for different sports activities and challenging jobs.

The weakness of tribes:

As the strengths are discussed above, they have few weaknesses also. The first one is language. They are comfortable in their own language, thus isolate them from the rest of the world. Every locality have difference language and different dialect of the same language and that makes it more difficult to communicate.

The second one is education. The education level is very poor. In recent times, small children are going to primary school, however the drop out is very high.

The third major problem is "believe in superstition". They have habit of believing super power, witches etc. which leads to several unwanted incidences in their society.

The fourth point is that even though tribes have diverse resource of foods, they do not have knowledge about nutrition. So, they are malnourished most of the time. Sometimes, they just do the opposite thing which they should not do in a diseased condition.

The fifth point is the lack of hygienic sense. Because of that, the rate of infectious disease is very high among them. The same pond water or water body is used for cleaning utensils, washing clothes, cleaning hands and cleaning animals.

The sixth point is that, they don't believe and have trust on outsiders or other community people. As they do not understand the language properly, it is very obvious that the message is not passed to them properly. This creates problems in teaching them anything or training them for their own betterment.

What can be done?

There are several initiatives which have been taken by government for the improvement of their condition, increasing education rate, making roads, providing proper sanitary system, health facility, training them to increase employment etc. Besides, there are several NGOs who are working hard in different localities for their upliftment.

The main thing is "Knowledge is power". Hence, provide education at the beginning in their own

language will put them in main stream. It will be extremely important to conduct awareness programs through the educated tribal people about their hygiene, nutrition, infectious diseases, finance management, cultivation etc.

The awareness program can be related to different Govt policies and financial policies to help them. They can also be trained for their cultural activities, art, agriculture, fishery, animal husbandry to earn their livelihood. They can also be trained for proper natural resource management and preservation or conservation of forest resources.

The tribal people can be trained with recently developed eco-friendly and cost-effective tools for their agriculture and food processing.

India has an elaborate legal framework of national laws to protect environment. The awareness program should be conducted to make the tribal people aware about these. The following acts were legislated by Government of India to preserve forest and wildlife.

- Environmental Protection Act, 1986.
- Forest Conservation Act, 1980.
- Wildlife (Protection) Act, 1972.
- National Environmental Tribunal Act, 1995.
- National Environment Appellate Authority Act, 1997.
- National Green Tribunal (NGT) Act, 2010

The awareness program on these acts would be beneficial for tribal people and definitely for the environment.

Conclusion:

Several initiatives have been taken by Government and NGOs to improve the livelihood of tribes. It is necessary pursue this in an integrated way covering education, culture, agriculture, fishery, skill development, animal husbandry, sports, health and nutrition which will lend to their upliftment on a sustainable basis.



TRIBAL HEALTH PROBLEMS, DISEASES AND CHALLENGES

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Introduction

Health is defined as a state of complete physical, mental and social well being and not merely absence of disease and Infirmary(WHO1994).It is a perfect interaction of internal environment with his external environment consisting of physical, chemical and biological surroundings. Article 21 of the Constitution says 'No person shall be deprived of his life or personal liberty, except according to procedure established by law'. Hence good health, is a fundamental right.Special care should be taken for the underprivileged - the rural poor, the Scheduled Castes and the Scheduled Tribes and other neglected segments of the population (Sachidananda, 1994, Virginius Xaxa, 2015).The governments in all countries are paying special attention to development of the tribes (Nithya, 2014). Though steps are taken for upliftment of tribals, a desired level of development has not been achieved yet (Chandra Guru et al 2015).

According to Census 2011 Indian tribes constitute around 8.2 percent of the nation's total population, consisting nearly 84 million populations.The state of Orissa occupies a unique position in the tribal map of India having 62 scheduled tribal communities, unevenly distributed in forest and hilly areas including 13 primitive tribes with a population of over 4.2 crores as per 2011 Census. The tribal community with various ethnic, linguistic, cultural, religious, moral values, traditions, folklore styles, food habits, and genetic strands maintaining at various levels of development - social, cultural and economic life. They mainly depend on hunting and food gathering and shifting cultivation. They live in varied habitats, climatic conditions and ecological niches. (Bhasin and Walter 2001).

Health culture and health problems in tribals

Health is a universally cherished goal. Health cannot be forced upon the people.The organization of health services to all people is considered to be the key step towards development (Srinivasan, 1987).Tribal communities in general and primitive tribal groups in particular are highly disease prone(Sobsey et al, 2003).The health status of the tribal population is very poor and worst among the primitive tribes because of their isolation, remoteness and being largely unaffected by the development process going on in the country.Tribal people suffer from special health problems such as malaria, sexually transmitted diseases, tuberculosis, nutritional deficiency diseases, genetic disorders like glucose-6-phosphate dehydrogenase (G6PD) deficiency, sickle cell anemia, etc(Balvir,2004b,Kaeda et al 2004).Apart from this certain unhealthy practices such as excessive drinking of country made alcohol,excessive salt intake, excessive smoking and regular betel nut chewing causes liver cirrhosis, hypertension, oral cancer, chronic respiratory diseases (Mini and Moli, 2005). According to WHO, alcoholic consumption has many health consequences resulting from intoxication and dependence.

Ecology plays an important, indeed, dominant role in creating structures of health and prosperity of tribals (Khera, 1994).The conditions like poverty,illiteracy, malnutrition, absence of safe drinking water and unhygienic surrounding, poor maternal and child health services,anemia and nutritional factors are responsible for poor health condition of tribal people(Hutton et al, 2007).The maternal mortality was reported to behigh among various tribal groups. The chief causes of maternal and child mortality were found tobe unhygienic and prhnitive practices for parturition and lack of immunization programme

(Basu, 2000, Vashishtha, 2009). Apart from that the tribal health is interrelated with socio-cultural beliefs and practices (Sonowal and Jojo, 2003, Jaganath Dash and Kabiraj Behera, 2010).

Traditional Health Care System of tribals

The health system and medical knowledge of tribals over ages known as 'Traditional Health Care System' depend both on the herbal and the psychosomatic lines of treatment. While plants, flowers, seeds, animals and other naturally available substances formed the major basis of treatment (Balgir, 1997). Health care is one of the most important of all human endeavours to improve the quality of life especially of the tribal people (Balgir, 1997, 2004a, 2005a). Health and treatment are very much connected with the environment, particularly the forest ecology. The disease and treatment cannot be properly understood in isolation of environment in tribal society. According to the knowledge of many medicinal plants has often been derived through their observation of other animals in nature (Mohapatro, 2010). But, due to deforestation the sources of various medicinal plants have been destroyed. Again, in many cases it has been observed that certain diseases may be common in certain areas, but they are controlled because of certain food habits based on vegetation available locally, or certain practices which have been generated through tradition. Hence, any disturbance in the eco-system is likely to affect the balance in human society.

List of herbal medicines used by tribals

- Asparagus racemosus (Shatavari)-A potent Ayurvedic rejuvenative and strengthen immune system
- Commiphora mukul (Guggul)-A major ingredient in joint and immunocare
- Melia azadirachta (Nimba)- It has strong health alleviating activity, used as a tonic and astringent that promotes healing
- Momordica charantia (Karela)-It contains Gurmarin, a polypeptide and has a strong sugar regulating effect
- Piper longum (Pippali)-Pippali is a powerful stimulant for both the digestive and respiratory system

- Piper nigrum (Black pepper)-It helps the body to absorb nutrients contained in the food and aid the digestive process.
- Tinospora cordifolia (Guduchi)-Guduchi is a rich source of Vitamin C.
- Wilthania somnifera (Ashwagandha)-It is one of the best health tonic
- Zingiber officinale (Ginger)-It is used to improve digestion and prevent nausea

The health challenges in tribal areas

- Lack of awareness of people for availing medical facilities.
- Economically poor.
- Poor transport facilities.
- Nonavailability of qualified medical practitioner, health workers and Doctors in the village.

Suggestive Steps

- A complete Mobile hospital should be set up.
- A mass awareness and preventive programme about common prevalent diseases should be launched.
- Mass detection of genetically transmitted diseases such as hemoglobinopathies, b-thalassemia syndrome, G6PD deficiency, hemophilia, colour blindness, etc. should be done at an interval of time.
- Marriage Counsellor to be provided in tribal communities.
- common prevalent diseases should be identified for future course of action.
- Local agricultural produce should be marketed for economic development
- Immunization programme should be given more importance.

Conclusion

In spite of the advancement in the field of preventive and curative medicine, the health care delivery services in tribal communities especially in Orissa continue to be poor and need proper attention to achieve the targeted goals of health for all.

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ETHNOMEDICINAL PLANTS USED AS ABORTIFACIENTS BY THE TRIBAL PEOPLE OF KORAPUT DISTRICT

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Abstract

Tribal medicine is a part of traditional medicine practiced by the tribal people in the forest. The paper presents the ethno-medicinal use of certain plants used by the tribal people of Koraput. The paper highlights the curing of different diseases by using a single or a group of plant species. Various parts of plants in different forms are used to cure different diseases. Apart from this, a note on tribal vegetation pattern, tribal population and geography of Koraput district is given. Disaries (Village Baidyas) follow a holistic approach of healing body, mind and spirit by the use of plants and plant parts. The knowledge that can help us to restore our planet is Ethno-medicine. A scientific approach that propels plant interactions at all levels and inturn helps in the preservation of plant species. With the preservation of traditional knowledge we can also preserve our rich cultural heritage. By conserving rare species of plants we can also conserve food and medicine in a sustainable way. All the plants were enumerated with botanical name, family name, local name and use as abortifacients.

Objective

The objective of this study is to chronicle the utilization pattern of a number of plant species used by the tribal people of the interior blocks of Koraput. The traditions of ethno-medicine are preserved only by oral method. This paper deals with the studies of identification and its taxonomy, cognitive characterization of the eventual natural material from which the remedy is produced, traditional preparation of the medicine, bio-evaluation of the medicinal action of such preparations, socio-medical aspects of the medicines and public health and use of these medicines. The main approach is to connect modern medicine to traditional healing. The focus was to study , collect and document information on utilization of medicinal plants by the practitioners of Koraput

Study Area

Koraput district in Odisha comes under the hilly ranges of eastern ghats. The natural beauty of the land with undulating hills, mountains, hills, rivers, forest, waterfalls, amazing flora and fauna is capable of mesmerising any tourists. Forests are an integral part

of tribal culture and tradition. They observe a number of festivals in the tribal areas to keep them fresh. Topography of the district is undulating. It has broken mountains intercepted by large river beds. It experiences six month dry period and six month wet period. Minimum and maximum temperature is 13° to 35° centigrade.

Introduction

Life originated on earth more than 3 to 4 billion years ago. Organisms stabilized and increased in number. Many plants and animals appeared. The green world ranging from algae to the angiosperms, each having its own peculiarities amazed mankind (Mondal, 1970). Plants evolved more than 430 million years ago. More than a quarter of million species dominated the land, capturing energy from the sun, building the soil, and managing the structure of all communities on earth (Raveen and Johnson, 1987). People have always identified, classified and given names to organisms in order to be able to communicate about them. Linnaeus used the binomial nomenclature that is still in use in the laboratories.

BODY

Next to food for sustaining life, man's dependence on plant life for health as well as fighting diseases has been as old as human existence. Along with the development of Ayurveda as science of life and health three thousand years ago, studies have also been made in the identification of plants of medicinal values and also about their quality, uses and remedies for specific diseases (Dayal, 1997). Ayurveda is an extension of Rig Veda. Its approach is more preventive than curative (India Today, March 31, 2005). Due to the studies of ethno-medicine, it can be said now that about 85% of the traditional medicines are derived from plants. In India more than 43% of the total flowering plants are reported to be of medicinal importance. Most of the medicinal plants possesses one or more properties and cure one or more diseases. Antibacterial, antiviral, anti-helminthic, anti-cancer, sedative, laxative, diuretic medicines are some examples of medicines obtained from plants. *Acorus calamus* is used as a tranquilizer, *Cassia augustifolia* is used as cathartic, *Holarrhena antidysenterica* can be used in case of dysentery, *Tarminalia arjuna* is used as a cardiac tonic. These are just a few examples among many medicinal uses of plants and plant parts.

The drugs obtained from the plants are useful because they encourage nature's healing power and are generally devoid of harmful side effects. Their action is gradual and long lasting (Dayal, 1997). Medicinal plants are used to treat more than seventeen major health problems, including skin diseases, stomach ailments, nerve disorders, poisoning, complications accompanying child birth, bone and joint problems, blood circulation and high blood pressure (Soedjito and Sorensen, 1996). The long run intimacy of our ancestors with the plant kingdom started human civilization. Scientists have rediscovered the real wisdom of the plants knowledge (Parthan and Amladi). Even with over 7500 species of medicine for preventive, promotive and curative properties for various vertebrate and human health problems, still it is suffering from scientific recognition and social protection. Despite its efficacy in treating varied complex diseases, it has not been widely accepted because of lack of documentation. So it is important to generate proper scientific

documentation about traditional products (Science Express, Indian Express, 7th April, 1998).

According to the studies of ethno-medicine and folk medicine about 2000 plants are used by about 4000 Indian drug industries. Currently active ingredients used as drugs are being identified and isolated from various plant species by phyto-chemical examination. Chemical examination of medicinal plants by Hitherto unexplored about the use of medicinal plants in discovering new drugs (Mani et al, 1997). In order to determine what medicinal properties these plants possess experimentation started. Many of these plants collected were grown wild and very few are cultivated (Chorpa and Chorpa , 1955). In today's context of globalisation, one need to give equal status to the confined non-western medicinal systems. These systems have to be given freedom to in their own basis of indigenous theories. Natural conservation strategies focus on the cultivation of medicinal plants. It is believed that the medicinal properties of plants are due to the presence of the secondary metabolites. Secondary metabolites are found in plants only if they grow in their natural surroundings under particular conditions. It is therefore doubtful that if these plants would express their medicinal properties in monoculture cultivation. Generally polyculture models of cultivation are preferred to monoculture ones . It is also advisable to grow plants in their native agro-climatic locations where they are naturally distributed (Science Express, Indian Express, 1998).

To make the best judicious use of natural wealth, a number of medicinal plants have been chemically investigated. The active principles isolated from them are used as medicines. According to "The Economist" (London) a quarter of American prescriptions with more than 58 billion a year contain active ingredients isolated from plants which are used as drugs (Chatterjee and Pakrashi, 1991; Dayal, 1997). References to miracle herbs or wonder drugs are often found in old literature. It is possible that the efficacy of the herb depend on the total effect of the plant, locality of the natural occurrence of the plant, place of cultivation, these all influence the properties of the drug (Agarwal and Ghosh, 1989).

TABLE -1

PERCENTAGE OF MEDICINAL PLANTS BY PARTS USED ARE GIVEN IN THE TABLE:

PLANT PARTS USED	PERCENTAGE
Flowers	5.2
Fruits	10.3
Seeds	6.6
Stem	5.5
Bark	13.5
Wood	2.8
Whole Plant	16.3
Rhizomes	4.4
Roots	29.6
Leaves	5.8

Materials, Methods, Observation and Collections:

The method of collection of information is either by Surveys, Questionnaires, Interviews or by Field trips. Various trips were made to the nearby tribal village areas during the work to collect information regarding the uses of plants for the treatment of different ailments by the means of simple personal interview with the tribal community. Tribal people are found to be relatively secretive about giving information. Many such trips were made to be close with the tribal people and then only information regarding medicinal plants were collected. All the gathered information were carefully documented. These collected information were verified and compared with the available literature and texts. During several trips to certain areas it came into light that people of remote are as possesses a great deal of knowledge about the medicinal uses of plants and they are still using them with great faith. Thus the aboriginal knowledge is till now preserved. They use plant parts not only for medicinal properties but also for other different purposes like killing of animals, insects, pests, etc. After the experimentation it was also found that tribal people use a single plant or a number of plant species to cure the same disease. Sometimes a particular plant species is found to be used in several diseases. They use the plant or plant parts by various methods or ways. Some of the methods are:

1. Plant parts are directly used for external purposes.
2. Plant parts are boiled in water to make decoction.

3. Plant parts are soaked in water to make infusion.
4. Plant parts are dried and powdered.
5. Plant parts are directly chewed.
6. Plant parts are rubbed and inhaled.
7. Plant parts are powered and made into paste.
8. Plant parts kept near the body or affected areas.
9. Tender leaves roasted and pulverised.
10. Extracts of fresh bark taken with milk.
11. Plant parts grounded together.
12. Plant latex is used externally.
13. Honey from flowers consumed directly.
14. Smoke of plant parts used orally.
15. Plant parts together
16. Plants used with other drugs.

The plants have been found to be greatly used in the treatment of diseases and improvement of health. The therapeutic activity of the plant does not depend solely upon a single readily identifiable constituent, but upon total chemical nature of the plants or more specifically the chemical nature of the plant extract used. The specific activity may easily be modified by other constituents present in it.

TABLE -2

PLANT OR PLANT PARTS USED AS KILLER CHEMICALS/ AGENTS WHICH HELPS IN INDUCING ABORTION:

Name of the plants	Plant parts
<i>Abrus precatorious</i>	Root
<i>Ananas comosus</i>	Fruit
<i>Annona reticulate</i>	Seed
<i>Areca catechu</i>	Shoot
<i>Aristolochia indica</i>	Root
<i>Daucus carota</i>	Seed
<i>Dendrocalamus strictus</i>	Leaf
<i>Gaultheria fragrantissima</i>	Whole Plant
<i>Gloriosa superba</i>	Root
<i>Gossypium arboreum</i>	Root Bark
<i>Momordica charantia</i>	Root
<i>Momordica tuberosa</i>	Root
<i>Moringa oleifera</i>	Root
<i>Nerium indicum</i>	Whole Plant
<i>Plumbago indica</i>	Whole Plant
<i>Randia dumetorum</i>	Whole Plant
<i>Trianthema portulacastrum</i>	Leaf
<i>Withania somniferum</i>	Whole Plant

TABLE -3

PLANTS WITH THEIR BOTANICAL NAMES, FAMILY NAME AND LOCAL NAME ARE GIVEN

Botanical name	Family	Local name
<i>Abrus precatorious</i>	Fabaceae	Gunja
<i>Ananas comosus</i>	Bromeliaceae	Sapuri
<i>Annona reticulate</i>	Annonaceae	Sitaphala
<i>Areca catechu</i>	Arecaceae	Gua
<i>Aristolochia indica</i>	Aristolochiaceae	Garudakkodi
<i>Daucus carota</i>	Apiaceae	Pakhibasa
<i>Dendrocalamus strictus</i>	Poaceae	Kalikata bausan
<i>Gaultheria fragrantissima</i>	Ericaceae	Sabuja Sita
<i>Gloriosa superba</i>	Colchicaceae	Bagha panjha
<i>Gossypium arboreum</i>	Malvaceae	Tula
<i>Momordica charantia</i>	Cucurbitaceae	Kalara
<i>Momordica tuberosa</i>	Cucurbitaceae	Chachindra
<i>Moringa oleifera</i>	Moringaceae	Chunee
<i>Nerium indicum</i>	Apocynaceae	Karabira
<i>Plumbago indica</i>	Plumbaginaceae	Rangani
<i>Randia dumetorum</i>	Rubiaceae	Jamukoli
<i>Trianthema portulacastrum</i>	Aizoaceae	Pathara Phula
<i>Withania somnifera</i>	Solanaceae	Aphima

Results and discussions:

The above study reveals that in absence of modern health facility people of interior areas of Koraput are completely dependent on plants for medicinal purposes. These plants are used for curing simple cuts and burns to highly complicated disorders. The village baidyas or disaris have sound knowledge on medicinal plants. They take care of all other local people of the area and never disclose the medicinal values to others. Thus it passes from parents to their children especially boys as oral tradition. Documentation, experimentation and characterisation of this knowledge is a must for the success of ethno-medicinal study. The plants which are commonly used as abortifacients are characterised and identified by using Hanes flora.

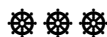
Conclusion:

The biological screening of plants help to find out the biologically active chemical compounds. These can be used in the preparation of various drugs. The research and developments in this field are interdisciplinary and require concerted participation of botanists, phyto-chemists, pharmacologists and clinicians. The mass cultivation of plants can be done which shows toxic properties due to the presence of alkaloids. These plant parts may be grinded, dried, rubbed or directly applied on the effected part. The juice after its extraction can also be used to test its property scientifically. After test results the intended plants are cultured in the laboratory, pot cultures and the plants are allowed to grow in the open fields in their natural habitat. The identified plants are required to be studied for locating toxic elements. Af-

ter segregating and eliminating the toxic property, the plant parts are processed. The identified plants are grown on a commercial scale in the open fields in a natural way. By growing naturally plants possess the alkaloids which are tested for characterisation. The chemical structures are identified and the alkaloids are tried to replace with these original synthetic chemicals. In an aging society with fewer children, the average lifespan is decreasing, cultivation and use of medicinal plant has the twin advantage of long life of health and wealth at individual level and a healthy and wealthy society.

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ROLE OF MATHEMATICS IN THE UPLIFTMENT OF TRIBAL'S

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Introduction

The state of odisha occupies a unique position in the tribal map. As per the census 2011, the state of odisha has the third highest percentage of tribal population in the country. The state has 62 different tribal communities spread over 30 districts and 314 blocks. They contribute 22.85% of the total population of the state and contribute 9.17% to the total population of the country. Odisha is the third largest tribal state next to Madhyapradesh and Maharashtra in the country. This state is the homeland of 62 different tribal communities numbering 9590756 as per 2011 census. Only next to Madhyapradesh and Maharashtra this state consists of the largest tribal population in the country.

Linguistically the tribes of odisha are broadly classified in to three categories namely-

- i) Indo-Aryan speakers
- ii) Dravidian speakers
- iii) Austric speakers.

On the basis of levels of integration tribal people are divided in to five kinds. They are-

- i) Distinct communities
- ii) Rural tribal's
- iii) semi acculturated tribal's
- iv) Acculturated tribal's
- v) Totally assimilated tribal's.

On economic point of view tribal people are of three kinds . They are

- i) Eco system
- ii) Traditional economy
- iii) Supernatural belief and practices.

Tribal people are of three kinds on the basis of levels of development. They are i) particularly vulnerable tribal groups. Birahar, Bonda, Chuktia-Bhunja,

Didayi. ii) Tribes in transition-santal, kharia, oraon, kissan iii) Assimilated tribes-Savar, Gond, Bathudi .

About 44.7% of the area of the state has been declared as scheduled area in accordance with the orders of the president of India. Special attention to be given to the PVTGs as they are diverse in character, live in different environments in interior pockets, their socio-economic and educational conditions are much worse, they are of very low level of literacy and low level of techno-economy.

For appreciating the role of mathematics in the development of the tribal people or in a broader term the world in totality we need to have a better understanding of the following;

Meaning of mathematics.

The importance of mathematics.

Meaning of development .

Need of Mathematics in the Changing tribal World.

The role of mathematics in the development of tribals.

Meaning of mathematics

What is mathematics?' The answer to this question is of course complex; there are elaborate elucidations, some excellent, on the subject but inevitably, even the best accounts give incomplete answers.

Mathematics is a branch of science, which deals with numbers and their operations. It involves calculation, computation, solving of problems etc. Its dictionary meaning states that, 'Mathematics is the science of numbers and space' or 'Mathematics is the science of measurement, quantity and magnitude'. It is exact, precise, systematic and a logical subject.

Mathematics reveals hidden patterns that help us to understand the world around us. Now, much more than arithmetic and geometry, mathematics today is

a diverse discipline that deals with data, measurements and observations from science, with inference, deduction, and proof; and with mathematical models of natural phenomena, of human behavior, and of social systems.

It may also be defined as, 'Mathematics is the study of quantity, structure, space and change; it has historically developed, through the use of abstraction and logical reasoning, from counting, calculation, measurement, and the study of the shapes and motions of physical objects. There are many definitions of mathematics but no one definition of mathematics is universally accepted. Some of them are as follows:

According to Angels

"Mathematics is a science whose subject matter is special forms and quantitative relationships of the real world".

According to Pierce

"Mathematics is the science, which draws necessary conclusion".

According to Locke

"Mathematic is a way to settle in the mind of children a habit of reasoning".

In a simple way we can say that mathematic has originated from numbers and number system is a special field of it, from which other branches of mathematics are developed. It is a systematized, organized and an exact branch of science.

Importance of mathematics

The literal meaning of mathematics is "things which can be counted" now you can think that counting has vital role in our daily life; just imagine that there were no mathematics at all, how would it be possible for us to count members of the family, number of students in the class, rupees in the pocket, runs in a cricket match, days in a week or in a months or years? On a basic level you need to be able to count, add, subtract, multiply, and divide.

At a psychological level, exposure to mathematics helps in developing an analytic mind and assists in better organization of ideas and accurate expression of thoughts. At a more general level, far away from dealing with the higher mathematical concepts, the

importance of mathematics for a common man underpinned. A common man is being increasingly dependent upon the application of science and technology in the day-to-day activities of life, the role of mathematics has undoubtedly been redefined. Mathematics is around us. It is present in different forms; Right from getting up in early hours of the day to the ringing of an alarm, reading time on a watch, rounding a date on a calendar, picking up the phone, preparing a recipe in the kitchen, to wait for the counts of whistles of the cooker, manage the money, travel to some place, to exchange currency at a ticket outlet while availing a public conveyance or checking up the mileage of your car, halting at the filling station, attending to a roll call at school, getting scores in the class exams, even meet new friends the list is just endless if one goes on to note down the situations when our computational skill, or more specifically, simple mathematics comes to play a role, almost every next moment we do the simple calculations at the back of our mind. Of course these are all done pretty unconsciously without a thought being spared for the use of mathematics on all such occasions.

Even when we think of role of mathematics in our recreational activities, we surprisingly have a list that runs quite long: video games, computer games, puzzles, riddles, hockey, cricket, kho- kho, kabaddi, football, basketball etc. A cricket captain once said that if he got his field placement right, half the job of getting the other team out would be done. And what does field placement require? An astute sense of the game and of space; all the above games require an instinctive awareness and utilization of space. While doing crosswords, we need to see length of the words we fill in, the matching of the common letters, and so on. What about board games like chess? While playing, you need to think of a winning strategy. For this you need to construct the possible movement at any instant, giving the conditions under which the different pieces are allowed to move. In Ludo, Chaupad, Trade, and other such games, the players use a lot of mathematics. It scares us to certain extent to think of a life without any knowledge of calculation or computation, or in other words mathematics.

Mathematics helps the man to give exact interpretation to his ideas and conclusions. It is the numerical and calculation part of man's life and

knowledge. It plays a predominant role in our everyday life and it has become an indispensable factor for the progress of our present day world. Even nature also embraces mathematics completely. We see so much of symmetry-around us and have a deep sense of awareness and appreciation of patterns. Observe any natural thing and find out symmetry or pattern in it. Change of day into night, summer into winter etc. In plants there are innumerable examples of symmetry, shapes, patterns, etc. Such examples exist in animals, in objects, in pictures and other things. The sun rises and sets at specified moment. The stars appear at fixed time. Mathematics runs in the veins of natural sciences like Physics and Astronomy. This subject is inextricably incorporated with world and the natural phenomena.

Importance of mathematics can be understood by the definition given by Galileo. He defined mathematics as 'a language in which God has written the world'.

Meaning of development

The term development can be understood as:

- i) Advancement of knowledge.
- ii) A process in which something passes by degrees to a different stage, especially a more advanced or mature stage
- iii) Systematic use of scientific and technical knowledge to meet specific objectives or requirements
- iv) Extension of the theoretical or practical aspects of a concept, design, discovery or invention.
- v) Process of economic and social transformation which is based on complex cultural and environmental factors and their interactions.
- vi) Process of adding improvement to a land, such as grading, subdivision drainage, access roads and utilities.
- vii) The act of developing or disclosing that which is unknown; a gradual unfolding process by which anything is developed, as a plan or method, or an image, gradual advancement or growth through a series of progressive changes; also, the result of developing, or a developed state.

We live in a time of extraordinary and accelerating change i.e., a new phase of development. New knowledge, tools, and ways of doing and communicating mathematics continue to emerge and evolve. Calculators, too expensive for common use in the early eighties, now are not only commonplace and inexpensive but vastly more powerful. Quantitative information available to limited numbers of people a few years ago is now widely disseminated through popular media outlets. Now we will see that what is the role of mathematics in the development?

To understand the role of mathematics in the development, first we have to see the need of mathematics in the developed or changing world.

The Need for Mathematics for Changing tribal World

The need to understand and be able to use mathematics in everyday life and in the workplace has never been greater and will continue to increase. For example:

Mathematics for Life:

Knowing mathematics can be personally satisfying and empowering. The underpinnings of everyday life are increasingly mathematical and technological. For instance, making purchasing decisions, choosing insurance or health plans, and voting knowledgeably all call for quantitative sophistication.

Mathematics as a part of Cultural Heritage:

Mathematics is one of the greatest cultural and Intellectual achievements of human-kind, and citizens should develop an appreciation and Understanding of that achievement, including its aesthetic and even recreational aspects.

Mathematics for the Workplace:

Just as the level of mathematics needed for intelligent citizenship has increased dramatically, so too has the level of mathematical thinking and problem solving needed in the workplace, in professional areas ranging from health care to graphic design.

Mathematics for the Scientific and Technical Community.

Although all careers require a foundation of mathematical knowledge, some are mathematics

intensive. More students must pursue an educational path that will prepare them for lifelong work as mathematicians, statisticians, engineers, and scientists. In this changing world, those who understand and can do mathematics will have significantly enhanced opportunities and options for shaping their futures. Mathematical competence opens doors to productive futures. A lack of mathematical competence keeps those doors closed. Generally it is an assumption that mathematics is only for the select few. On the contrary, every one needs to understand mathematics. All students should have the opportunity and the support necessary to learn significant mathematics with depth and understanding. There is no conflict between equity and excellence. Principles and Standards call for a common foundation of mathematics to be learned by all students.

This approach, however, does not imply that all students are alike. Students exhibit different talents, abilities, achievements, needs, and interests in mathematics. Nevertheless, all students must have access to the highest-quality mathematics instructional programs. Students with a deep interest in pursuing mathematical and scientific careers must have their talents and interests engaged. Likewise, students with special educational needs must have the opportunities and support they require to attain a substantial understanding of important mathematics. A society in which only a few have the mathematical knowledge needed to fill crucial economic, political, and scientific roles is not consistent with the values of a just democratic system or its economic needs.

The role of mathematics in the development of tribal society

A society, or a human society, is a group of people related to each other through persistent relations, or a large social grouping sharing the same geographical or virtual territory, subject to the same political authority and dominant cultural expectations. More broadly, a society may be described as an economic, social, or industrial infrastructure, made up of a varied collection of individuals.

Mathematics occupies a crucial and unique role in the human societies and represents a strategic key

in the development of the whole mankind. The ability to compute, related to the power of technology and to the ability of social organisation, and the geometrical understanding of space-time, that is the physical world and its natural patterns, show the role of Mathematics in the development of a Society. The society consists of its members (human being), who make government and organize the natural resources to develop infrastructure. The human beings are the one who develop the society. Therefore, we will discuss the role of mathematics in the development of an individual as well as the development of the society.

To understand the role of mathematics in the development of an individual and of society, we need to discuss the following;

At Personal Level

- i) Social Development
- ii) Intellectual Development
- iii) Vocational Development
- iv) Moral Development
- v) Spiritual Development
- vi) Cultural Development

At Societal Level

- i) Education system
- ii) Economics
- iii) Infrastructure
- iv) Science and development
- v) Medical science
- vi) Agricultural field
- vii) Cultural and Morality
- viii) Living standard

First we will discuss the role of mathematics at Personal Level;

i) Role of Mathematics in Social Development

Man is a social animal and human life depends upon the co-operation of each other. Group work helps social skills. The ability to work together on tasks with others can build various social skills. In order to live a social life, mathematical knowledge is needed, because of the give and take process, business and industry depends upon the knowledge of mathematics. The change in the social structure with regards to the modern facilities like mode of transport, means of communication and progress in

the field of science and technology is due to mathematics only. In this way mathematics has played an important role in not only understanding the progress of society but also to develop the society.

ii) Role of Mathematics in Intellectual Development

Mathematics teaching is very important for intellectual developments there is no other subject in the curriculum likes mathematics which make students brain active. Problem solving helps in the development of mental faculties. Mental work is needed to solve mathematical problems. If a child, has a mathematical problem her/his brain becomes active in solving that problem. Each problem of mathematics posses such sequence which is necessary for constructive and creative process. In this way, all-mental abilities of child are developed through mathematics.

Moreover, mathematics makes the man very calculating so that she/he cans economies time, money, speech, thought etc. It develops a strong will power, patience and self-reliance. It, also develop the faculty of discovery and invention.

iii) Role of Mathematics in Vocational Development

The main aim of education is to help the children to earn their living and to make them self-independent. To achieve this aim mathematics is the most important subject than any other. It (this aim) helps to prepare students for technical and other vocations where mathematics is applied e.g. engineering, architecture, accountancy, banking, business, even the agriculture, tailoring, carpentry, surveying, and the office work requires the knowledge of mathematics.

iv) Role of Mathematics in Moral Development

Morality is the important phase of life, which is most, affected by time, person, situation and place. As a subject, mathematics can added to students moral development since mathematical knowledge is helpful in character and personality development. It develops all those quantities which a person of strong character must posses. Child develops qualities of cleanliness, reality.

v) Role of Mathematics in Spiritual Development

Mathematics main potential here seems to be regarding developing the skills of reflection and possibly, for the more receptive, a sense of the beauty of a solution. One gets pleasure in solving mathematical problems, especially when she/he gets the correct answers to her/his problem. At that moment every child feels satisfied, confident and self-reliance. The aesthetic quality of an elegant solution is something that may be lost on a dedicated "mathematics hater". So the child gets encouragement, satisfaction and happiness in attaining remarkable achievements. Therefore mathematics helps to develop their aesthetic sensibility, meets the varying interests and helps them in the proper utilization of their leisure time.

vi) Role of Mathematics in Cultural Development

This helps the learner to understand the contribution of mathematics in the development of civilization and culture. It has enabled her/him to understand the role of mathematics in fine arts and in beatifying human life.

At Societal Level

Now we will discuss the role of mathematics at Societal Level;

1. Role of Mathematics in the Development of Education System:

In education system, mathematics plays an important role in shaping the future probability of young people. Education is to develop an individual, to make her/him self-reliant, to make her/him wise, to make her/him a social contributor and in our education system, for almost every subject, we study in school and university; we need to study mathematics too e.g., Physics, Chemistry, Life-Science, Economics, Business and Accountancy, Geography, History, Psychology, Architect, Designing, Computes, Statistics, Commerce etc.

Also in vocational areas like Tailoring, Carpentry, Cooking, Beauticians, Sports person, Farming etc, mathematical knowledge is needed.

Even the professions like, Conductor, Shop Keeper, Drivers, Musicians, Magicians, Cashiers etc use basic mathematical concepts.

2. Role of Mathematics in Development of Economics:

Mathematics is of central importance to modern society. It provides the vital underpinning of the knowledge of economy. It is essential in the physical sciences, technology, business, financial services and many areas of ICT. It is also of growing importance in biology, medicine and many of the social sciences. Mathematics forms the basis of most scientific and industrial research and development. Increasingly, many complex systems and structures in the modern world can only be understood using mathematics and much of the design and control of high-technology systems depends on mathematical inputs and outputs. Economics of the society is developed by establishment of industries. The applied mathematics like computational science, applied analysis, optimization, differential equation, data analysis and discrete mathematics etc are essential in industrial field. By application of mathematical methods, the exploration cost of oil and communication cost of images could be reduced. Techniques of wavelets and fractals are used for this purpose. Numerical simulation of mathematical models helps to manufacture super conductor cables to reduce the cost of electricity.

3. Role of Mathematics in Development of Infrastructure:

In particular, mathematics has contributed to progress in science and technology for thousands of years and still continues to do so. It finds useful applications in development of infrastructure i.e., business, industry, music, politics, sports, medicine, agriculture, engineering, and the social and natural sciences. The physical appearance and development of infrastructure is crucial in a society. Thus, for the construction of roads, buildings, stadiums, flyovers, airports, dams, bridges, vehicles, airplanes etc. in mechanical engineering, civil engineering, electrical engineering etc

4. Role of Mathematics in Development of Science and Technology:

The "functional" aspect of mathematics stems from its importance as the language of Science, Technology and Engineering, and its role in their development. This involvement is as old as mathematics itself and

it can be argued that, without mathematics, there can be neither science nor engineering. In modern times, adoption of mathematical methods in the social, medical and physical sciences has expanded rapidly, confirming mathematics as an indispensable part of all school curricula and creating great demand for university-level mathematical training. Much of the demand stems directly from the need for mathematical and statistical modeling of phenomena. Such modeling is basic to all engineering, plays a vital role in all physical sciences and contributes significantly to the biological sciences, medicine, psychology, economics and commerce. Mathematics has been successfully used in the development of science and technology in 20th-21st century. The areas like advanced semiconductor devices, bio-technology, digital image technology, Nano-technology, artificial satellites, and rockets all are based on mathematical concepts. The recent success of NASA's Mars Rover is also based on mathematics.

5. Role of Mathematics in Development of Medical Science and Agricultural field:

Mathematics is applied to agriculture, ecology, epidemiology, tumor and cardiac modeling, DNA sequencing and gene technology. It is used to manufacture medical devices and diagnostics, opto-electronics and sensor technology.

There are positive senses in which mathematics is special. First, by virtue of its fundamental nature as a universal abstract language and its underpinning of the sciences, technology and engineering, mathematics has a claim to an inherently different status from most other disciplines. Secondly, as we have set out above, mathematics is fundamentally important in an all-pervasive way, both for the workplace and for the individual citizen.

6. Role of Mathematics in Cultural and Moral Development:

Mathematics has its own intrinsic beauty and aesthetic appeal, but its cultural role is determined mainly by its perceived educational qualities. The achievements and structures of mathematics are recognized as being among the greatest intellectual attainments of the human species and, therefore, are seen as being worthy of study in their own right,

while the heavy reliance of mathematics on logical reasoning is seen to have educational merit in a world where rational thought and behaviour are highly valued. Furthermore the potential for sharpening the wit and problem-solving abilities fostered by study of mathematics is also seen as contributing significantly to the general objectives of acquiring wisdom and intellectual capabilities.

A cultured citizen is one who follows the norms of society and one who is a civilized person. A well mannered person is always simple, original, patient, honest, accurate and disciplined. Mathematics is a subject which is exact, real, original and precise, and one who studies mathematics needs to follow the laws and rules.

Thus, mathematics helps the people to be cultured citizens having sound morals.

7. Role of Mathematics in the Development of Living Standards.

Since mathematics is used in almost every profession, it helps in improving the living-standards of a person. The developments in economics, science and technology, medicine in brief over-all development of society develops the standard of living. Thus mathematics plays an important role in improving the living standards. Although use of information technology has changed the nature of mathematical skills required, it has not reduced the need for mathematics. Last but not least, empowerment of women is essential since women constitute half of the society. This indicating potential of mathematics education in women empowerment.

8. The Role of Mathematics Education in Women Empowerment

The importance of Mathematics as a tool for science and technology is continually increasing. While science and technology have become so pervasive, mathematics education has continued to dominate the school curriculum and remains a key subject area requirement in higher education and employment sector. The hue and cry which follows the publication of mathematics results has become an annual ritual. The post-mortems about the results eclipse a number of areas where female students have lagged behind. This has also impacted on courses and careers sought by women in the working world. They have attributed

their failure to perform to expected standards to lack of sound background knowledge of mathematics. It is this realization that the skills learnt at school have had very little if any, bearing on what society needs in terms of productive citizens. In this regard, the gender imbalances in enrolment, achievement at school level, colleges and universities and the employment sector were also issues of concern. Our societies are becoming more and more technological with a mathematical bias, more attention being focused on attainment of mathematical competencies. Empowerment provides opportunities to increase knowledge and vocational skills for survival and also improves accessibility to more enterprising career paths for women. Imbalances in enrolment, performance, subjects and subsequent employment in jobs that have a mathematical inclination underscored the need for intervention programs to bridge the gap while it revealed the need for a curriculum reform as a mechanism for improving the quality of education. Corresponding changes in assessment procedures are seen fit to accompany these reforms so as to ensure a holistic approach to learning. This triggered the need for research into aspects pertaining to the role of mathematics education in assisting career choices undertaken by women. The argument is, to what extent does Mathematics education offer new challenges and opportunities for women advancement? The research sought to provide a diagnostic tool from which to view other changes that will seen fit in the teaching, learning and assessment of Mathematics in the context of women empowerment. It may also discuss why it is important to improve the present situation in mathematics education as a way of addressing gender inequalities. It will also provide a forum for creating a women-friendly environment through systematically documenting and publicizing the areas women find problematic apart from trying to establish ways of implementing a series of equal opportunities and affirmative action activities in the classroom and employment sector. In addition the research may also aimed at undertaking sensitization and social mobilization in support of the concerns of women, supporting the development and proper functioning of organizations that support women's concerns. By revealing the existing structural, organizational and institutional practices, the

research may target at how policies pertaining to these could accommodate the needs of women.

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ROLE OF INNOVATIVE TECHNOLOGY IN TRIBAL UPLIFTMENT

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Abstract

Through the importance of Science and Technology for rural India was appreciated in the 1930s by Gandhi, giving rise to the work of the Centre for Science for Villages, advanced institutions of education, science and technology turned their attention to this area only about 40 years later in the 1970s. To explore and Promote alternative livelihood potential (wherever the present occupation in dwindling) on innovative community-based approaches and technological options to enhance field-level impact. The most well-known of these efforts was from the Indian Institute of Science with its programme for the application of science and technology to rural areas known by its acronym ASTRA. Development and improvement, not only on people's material needs, the development of their social conditions, is related to the realization of their hopes, in developed countries, the knowledge generated through research and education used not only to realization social and economic objectives, as well as the use of the realization the individual's personal development is observed. The aim of this study is to explain the role of innovative technology on social development and progress, individual development and progress and to explain the dynamic relationships among these concepts. If these concepts are ordered in terms of their functions, the relationship between education and society in a healthy way and to explain the highly dynamic structure of education is not a routine process that affects every level of society as an social institution, political authority needs to be imposed that to build a prosperous society that education and knowledge are provision.

KEY Words : Education, Society, Social, relationship between Education and Society, Social Development

Introduction

The proposal particularly on Science and Technology application under TITE scheme should include the list of intended beneficiaries in terms of their tribes. The project related to livelihood aspects should clearly propose a strategy in which livelihoods are developed as microenterprises and establish effective and appropriate delivery systems for inputs and for maintenance of assets and recourses as well as strengthening of local institutions that relate to livelihood development and empowerment. Innovation can play a critical role in addressing socio-economic objectives which are affected by new classical growth models consider knowledge accumulation and technological. The necessity of harnessing science and technology for transforming rural India has long been recognised, In fact, Gandhi had already shown an appreciation of this necessity.

As early as 1935, at the ALL India Villages Industries Association, Gandhi initiated a movement called "Science for people". Social progress clearly indicates a general development in the community in terms of economic, science and cultural aspects, In sociological terminology, social development is used for a concept all positive developments in the social construct.

Body (Subtopic being addressed)

To promote research development and adaptation of Science and Technology for improving quality of life of tribal groups.

Initiation of location specific Science and Technology based program in major socio-economic sectors.

To preserve traditional artisan skills, building on local innovation and local knowledge systems in designing

local recourse management strategies through participatory research approach.

To improve existing equipment and machinery and introduction of new technique and complete technology package.

Broadening the impact of above Science and Technology based activities by promoting replication and scaling up of successful approaches leading towards empowerment and technical capacity building of tribal population.

Innovation play different roles at various stages, In earlier stages incremental innovation is often associated with the adoption of foreign technology and social innovation can improved.

Innovation is important at all stages of development, specially the creation and diffusion of technologies are important for economic growth and welfare across all economics and also innovation in agriculture is particularly relevant for addressing socioeconomic challenges at the same time as fostering growth.

Applications of Science and Technology for manpower development to generate alternate sources of income through sustainable cultivation systems agriculture and the establishment of non-farm enterprises at the micro and small-scale level.

Development opportunities for local communities around protected areas through technology focused bio-tourism and conservation for improved livelihood.

Facilitation of technology mission mode projects by complementary activities.

Sensitizing voluntary agencies, scientists of laboratories and related agencies to Science and Technology approach for tribal development through short-term brain- storming workshops and awareness generation to possible technology options; and other activities which would complement these objectives like workshops, Seminars, publications etc.

Land use, ecology, environment and energy by promoting Science and Technology based activities..(which activities)... which generate sustainable increases in production and productivity

of natural resources including water resources management

The scientific policy resolution adopted by the Government of India Late in March 1958, had emphasized the powerful role of Science and Technology in the development of the country as indicated below.

The key to national prosperity apart from the spirit of the people lies, in the modern age, in the effective combination of three factors technology raw materials and capital of which the first.

11-may-2013 mobile Technology offers extensive help on various forms of social and economic development, Technological innovation and information communication.

Innovation and growth value creation in addition to its role in providing global public goods, science, technology and innovation serves as a crucial driver of rising prosperity.

03-oct-2012 Innovation is the primary drive of technological growth and drives higher living standards, As an engine of growth the potential of technology is endless.

02-dec-2017 The incubator model of a supported structure to develop high-tech firms from academic research was imported from the USA to Brazil, where it serves a variety.

Searches related to role of innovative technology of tribal upliftment. Technological innovation for upliftment of tribal communities, Tribal sub plan, Tribal sub plan meaning, Impact of tribal development of programmes, Tribal development policy in India, Different approaches to tribal problems, Ministry of tribal problems, Government policy for tribal development, Facilities of tribal upliftment, Community development and change, Development of education and social upliftment, Economic upliftment of tribal population,

Conclusion

Improving the quality of life in general and poor in particular depends on availability of resources. The economic, political, institutional and technical capacity is required to be enhanced to produce and provide equitable access to these resources.

ROLE OF SCIENCE

Sustainable society requires existing social reality, power relations, economic and marketing to be dealt in a holistic basis.

Resources budgeted for education in fact is not expenditure but a crucial and profitable investment. All developed countries in today's world try their best to attract well-qualified labour force. Undoubtedly, carrying societal development provided with education to a more advanced level is possible by creating an attraction centre for educated people.

This identification is best done, not from a remote environment, but through direct contact and learning from the people.

The first step in the development of technology for the under privileged rural masses consists therefore of the identification of their felt needs.

Imperfect solutions have to be refined in an iterative process.

These technical challenges must excite technical personnel and motivate them to come up with solutions that are appropriate to the rural context.

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NATURE AND TRIBAL CULTURE: AN ETHICAL PERSPECTIVE

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Abstract

Living in harmony with nature has been a part of tribal culture. This has been reflected in their religious beliefs, rituals, folklore, art and their day-to-day life. Since the beginning of civilization, nature and indigenous population have evolved in symbiosis. They see nature not as something to be conquered or exploited for their welfare. They see it as the very foundation of their existence. Mountains, rivers, forests are revered and worshipped by them. Economic development, today, brings with it ecological imbalance, loss of tribal culture, their religious beliefs, their land and their identity. The joy of living, finding fulfilment in experience have evaporated from the lives of the tribals. It leads to the emergence of the concept of sustainable development which can be said to halt the exploitation and destruction of nature. Sustainability and ethical principles are intertwined. Sustainability concepts cannot be applied without strong ethical principles. Sustainable development presupposes morality. It requires us to go beyond our self-interest and to have concern for our fellow beings, both humans and non-humans. In this paper, an attempt has been made to show that a return towards ethicality is the only way to survive and it will lead us to a sustainable, flourishing future.

Introduction:

Had there been no scientific advancements we would still be hunting animals and living in caves. With scientific advancements, our priorities and needs have changed. We have moved from satisfying basic needs to satisfying more complex ones. We witness development in transportation, construction, communication, agriculture, medical technology and education. There is no doubt that in today's world, technology is an important part of our lives and it has a huge impact on the way we communicate, live and work. The debate continues, however on whether the part technology plays in our lives is positive or negative. We cannot deny the fact that science has bettered our lives in various ways. But at the same time, we cannot deny the devastating aspect of science and technology. That is another facet of science which is more important.

My inclination, in this paper is to look at this matter not through the lens of a scientist but through that of a philosopher and an ethicist. I have made an attempt to discuss the impact of science and technology on tribal way of life, of course, the negative side. And I have shown that turning towards ethicality is the only way out.

Body (subtopics being addressed):

For thousands of years, there has been a symbiotic relationship between the forest and the indigenous community. Since the beginning of human civilization, primitives used to live in the forest nurtured by nature. They lived isolated from the mainstream of life but in harmony with nature. Forests played a vital role in the socio-economic and cultural life of the tribals.

During the pre-independence period, there was area wise isolation which began with the enactment of the Government of India Act of 1870 and a few tracts were specified as 'scheduled tracts'. Again in 1936, two areas were created, namely, 'excluded areas' and 'partially excluded areas'. In 1939, Verrier Elwin, a British anthropologist advocated the establishment of a sort of 'National Park' of the tribals in a wild and largely inaccessible part of country under direct control of a tribal commissioner. Inside this area, administration should allow tribesmen to live their lives with utmost possible happiness and freedom. Everything possible would be done for the progress of tribals within this area, provided the quality of tribal life would not be impaired. Tribal culture would not be destroyed. Their contact with the outside world

should be reduced to the minimum. He thus supported the idea of 'isolationism' to a great extent.

During post-independence period, this policy of isolation was modified with welfare measures. The development process started during this period. Most of the development projects were designed and implemented to ease administration, such as construction of roads and bridges, and establishment of institutions. During this period, development was built upon the ideal of economic growth. In the middle of 1960s, development was mainly focused on industry toward the issues of agricultural production due to famine and drought in eastern India and global food crisis. The period from the mid 1960s to mid 1970s marked a shift in perspective. Efforts were made to focus on meeting the basic needs of the poor. The planners focused more on individual rather than the national economy at large. This was called the Basic Needs Approach to development which aimed at the achievement of a minimum standard of living before the end of the century. But this increased attention to basic needs was not at odds with economic growth. The Basic Needs Approach justified it in terms of low cost investments that would lead to increased human and economic productivity.

Besides this, the government took efforts to improve the life of tribals. Many development activities in the field of horticulture, animal husbandry, agriculture, health and education, construction of roads, buildings etc were undertaken in rapid succession in tribal areas. Such activities reached a peak in early nineties.

This process of development has been harsher in another respect. As the rate of development rises, tribals have been purposefully left behind. This development has led to displacement of tribal communities, uprooting ancient and traditional livelihoods and most importantly snatching away their rights to have authority on their own lives. A large number of tribals residing in and around the forests, mountains and resource rich areas are being forced to move away for the construction of dams, for setting up mines, airports or military bases. They are pushed to migrate to new environments where they are not able to cope up with new livelihoods.

Westernization in the name of development has devastated tribal way of life, its rich culture and language. They are made to think that they are inferior in matters of lifestyle, custom and folklore. The myth has been nurtured that the tribals paralyzed by their customs and their way of life should be raised to the advanced culture, a life enjoyed by the so-called advanced society. In this process of development, the tribals have acquired new languages, schools, medicines, tractors, big screen televisions and desk jobs. At the same time, they have lost their original language, prayers, dances, ceremonies, herbal medicines, religious beliefs, art, traditional methods of farming and hunting. They have lost their identity.

This development has also been accompanied by immense environmental damage due to deforestation, air and water pollution, soil erosion etc. which are said to be the inevitable costs of development. That led to the emergence of the concept of Sustainable Development. In order for development to be sustainable, it must meet the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable Development can be looked at from a variety of perspectives, such as environmental, economic, social, political, cultural and technological. None of the perspectives can stand alone. Sustainable Development is possible if all of them are taken into consideration. The idea is not to debar people from using earth's natural resources. It rather aims at such a pattern of use that, resources particularly those which are vital for human survival, are neither exhausted nor polluted nor destroyed. It requires a change in our attitude towards nature and also towards what we call economic development.

Environmental sustainability is needed for our survival. Human beings like other living entities come from nature. Nature has a nurturing role. The Hindu concept of Panchamahabhoota is relevant here. The five great elements must remain ample and pure to sustain life. The Vedic sage Atharvan wrote a homage to earth and incorporated it as 'Prithvi Sukta' of Atharva Veda. The essence of the Sukta is:

"The Earth is the mother and we are here children. People of other religious traditions may not be used to such reverence for nature. But they cannot ignore

the fact that the human destiny is inseparably linked with that of the Earth. It is therefore our duty to protect nature. It is in our self interest, if nothing else."

Conclusion:

Today there is an increasing focus on the environment leading to the quest for sustainable development. The quest for a sustainable world in which man and other living bodies can co-exist in a flourishing manner now and in future has prompted the need to think about its ethical aspect. This commitment to sustainable development is a rational choice based on ethical reasoning with the understanding that ethical behaviour is closely connected to the welfare of the society as a whole. Rationality requires us to consider our own interests as well as the interests of others. Albert Einstein says, "The most important human endeavour is the striving for morality in our action. Our inner balance and even our very existence depend on it. Only morality in our actions can give beauty and dignity to life."

So sustainability is a moral way of acting. Here we can talk about environmental ethics which is concerned with morality of human actions as they affect the environment they live in. There are three different views in environmental ethics, namely, anthropocentrism, which advocates that nature exists for the humans alone, biocentrism which advocates that nature exists not only for humans but for all living beings and ecocentrism which stresses upon the intrinsic value of nature and advocates that nature has to be protected and revered.

Ecologist Aldo Leopold expressed his view in 'The Land Ethic' which expands the community to include animals, plants and the land itself. Philosopher Arne Naess coins the term 'deep ecology' for similar sentiments. For him, all living things have intrinsic value. Humans have no rights to reduce the richness and diversity except to satisfy vital human needs. This value is independent of any instrumental usefulness for limited human purposes. The ecocentric outlook considers humanity and culture

as a part of nature. In 1987, the report of the World Commission on Environment and Development argued that

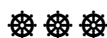
"Development must not endanger the natural systems that support life on earth: the atmosphere, the water, the soil and living beings."

This ecocentrism corresponds closely to the belief systems of the indigenous people who see themselves as a part of nature. This ecocentric world view follows naturally from their empathetic capacities. They remind us of the fact that we are a part of nature, if anything is worthy of respect, it is life itself. An ecocentric world view and corresponding value system is a necessary path toward the flourishing of life on earth including that of our own species.

Tribals representing indigenous people have their own philosophy, cultural uniqueness, potentialities and survival resources. All development strategies must be fixed by informed consent. The tribals should be given a chance to have their own internal determination which should be the guide in setting up the standards for control over their own economic, social and cultural development. The overall choice of adjusting with the larger society should be left to the tribals themselves. That is the only way to have a truly developed society.

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SCIENCE & TECHNOLOGY FOR THE DEVELOPMENT OF TRIBAL ARTS & CRAFTS

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In India more than 500 Tribal communities are living, out of which Orissa has 62 scheduled tribes. There are close cultural similarities among the tribal communities belonging to the same language group. There are some tribal communities who are economically backward, educationally less advanced and politically less conscious are labelled as primitive groups. Aspect of their day to day life are influenced by religious beliefs. The life cycle rituals of the Tribal people are uniquely significant. Starting from conception till death series of rituals are performed. By the large, the tribal people of Orissa have perpetuated their cultural identity and distinctiveness through several folk traditions and lifeways depicting their ethos, Ideologies and world-view. Different folk traditions, such as folk tales, legends, myths, riddles, proverbs, songs, ridicules, dance and music are significant items enriching their artistic and aesthetic urge. The tribal people of Orissa living in different ecosystems have shown their knowledge of architectural designs while making various house types. It varies from a leaf made conical small house (KUMBHA) among the Birhor to architecturally very well constructed Santal houses made of bricks and local tiles with beautiful wall paintings. The floors and walls are plastered with cow-dung different colours of black, red and yellow. Some artistic workmanship is also exhibited in the wall drawings in which different animal figures and hunting scenes are displayed.

Tribal communities have retained their rich and varied heritage of colourful dance and music. To them songs, dance and music are community activities which form an integral part in the celebration of religious festivals, wedding, funeral and occasional recreation and enjoyment. The

dances with various kinds of musical accompaniments or orchestra are varied. The dancers sing particular songs according to the occasion and type of dance. Special costumes are used at the time of dance not only rhythm but also projection of bodily parts according to necessity and music of the orchestra are of special mention. Although dancing in general is meant for recreations, rejoicing and enjoyment, it has greater relevance when it is connected with name giving ceremony, puberty rites, marriage and death rituals. Dancing connected with agricultural operation, festivals and ceremonies, for treatment of diseases and appeasing spirits etc. are having significant socio-cultural implication. Dance brings unity, strengthens social relationship and also extends intra and inter village relationship keeping in view the functions of dance and its performing art by several communities. Courtship dances are regular type of dances in which boys and girls are engaged in merry making when there are free and in special occasions. Such situations provide opportunities to the unmarried boys and girls to select their spouse.

In course of dance sequences the young men and women exchange emotions, feelings, sentimented appeals, through symbols. By and large the tribal people in general are lover of music. They manufacture their musical instruments of their own. They use varieties of musical instruments, such as drums, flutes, xylophones, harps, etc. Some wooden and bamboo pieces, fruits of tree, ornaments, sticks and palm of hands are also used to produce musical sounds. Besides Madala, there are other musical instruments like Banshi (flute) dhol (drum) tamka are nagara (kettle drum) Kartal and Mazina (ordinary cymbals) Mahuri (beguile) tundubudi gini (cymbals)

and tata (tambour) etc. The string instruments like behela (violin Sarangi and tamak, runji and ghumura, which are used by them during dance are also meticulously and skillfully designed by the tribals.

Tattooing is another kind of tribal art that really creates a sensational stir in the minds of the man of fine arts. The motive behind tattooing varies from tribe to tribe and so also the interpretation of the designs. Some believe that tattoo develops resistance power in the body and some other consider it as the decoration of body and cannot be removed at any cost. Some other also link it with sexual life and superstitious beliefs. There are skilled operators mostly females who have been traditionally trained in this art within tribal groups.

Hunting is not a past time game for the tribes. It is essentially an economic pursuit. The need made them to be expert in the art of making arrow and bow. They call wooden head arrow as thuthi and iron head arrow as thin. Since agriculture is the principal source of economy, the tribes also become experts in making plough, plough share, pata, sickle, hoe, axe, spade, knife, yohe, crowbar, wooden pole, akadi, bullock cart and stick. Net making is another art that also deserves the special attention to be viewed one would be really wonders struck to see a Birhor in fish catching state by use of nets made by Siali Creepers. Besides fish catching, nets are also made by the tribes. For fishing also they make fishing traps by using bamboo splits. Besides these basketry is another kind of art, which is as containers. The Kolhas are expert in making baskets and ropes out of Bobai grass. Tribals are experts in the art of liquor brewing. They are approached to brew liquors at the time of feasts, fairs and festivals.

The most ethnically fashioned Dongria Kondha tribe has their embroidery tradition tracked back to time long past. The tradition is that the lovelorn tribal girl, in order to please her lover prepares the embroidery and presents it to him. If the boy receives it, it leads to consummation of their union. The tradition of stitching embroidery still continues unabated in their wedding rituals. The most fascinating head dress of the Koya, the Kondha and special turban with birds feathers used by the Saora are very attractive and the tribal people are very fond of ornamentation of various parts of their

body with jewellery as embodiments grass growing in jungle are also used by many Odishan tribals for their adornment. They prepare beautiful necklaces forming patterns in the will grasses. Usually they use the dried tufts of grass blade with different colours. Bonda and Kutia Kondha use these special necklaces of their culture as one of the forms expressing their aesthetic sense. Mostly metals like brass, aluminium, alloys, white metal, silver and rarely gold are used. Apart from these beads, seeds and certain varieties of grasses, weeds, leaf and wooden sticks are shaped / designed for use as ornaments. The tribals like Juangas, Kutia Kondhas, Koyas and many others utilise their leisure time for making comb is being used for dressing hair, to enhance beauty and exchange as a gift among lovers.

Wood carving are magnificent examples of art among the tribal communities of Orissa. Artistic design of the wooden pillars representing the deities among the Saora beautiful notching and engraving in the meriah poles, workmanship on the symbolical magico religious sculptures on the wooden posts among the Kondha are some of the significant heritage and emotional make up of the tribal people. The tribal art has its pervasive influence in Odia society. The leaf-cups and plates made up of Sal leaves are the most required articles in celebration of fairs and festivals in Odia Society.

In this 21st century no doubt science & technology is very much developed but it seems it is yet to work towards the development of the tribals. Using print and electronics media and with personal interviews by using various techniques Art and Crafts of these communities can reach larger mass. Many new films, documentary can be prepared. Showing their Art and Craft techniques the tribal men prepare their daily necessities in their own hand. Those techniques are hard to find in our so called advanced society. It seems day by day the Art, paintings and tribal techniques for their upliftments are reducing without any strong support from every corner. But that unique techniques and materials can be preserved for a long time with digitalisation.

I feel sorry to say that now the educated tribal youth are forgetting their own Art, Craft and culture, but it is everybody's duty to make them more conscious with proper education to preserve their

own precious things. We can also preserve their tribal musuem, their manuscripts by innovating ways of more science & technology. Though many tribal development agencies from Govt. & Non govt. are working in the state & outside, to preserve the Tribal Art & Culture. But it is not enough. In this modern society if one, one best Art & Craft technique from each tribe will be preserved through various scientific method then we can achieve the best module for the society, and for the country.

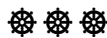
Conclusion

Workmanship of textile designs, embroidery works, bamboo art, cane wood, fiber, horn, leaf works, stone items, pottery, dokra items and jewelry represent unique skills, which are inherited. Traditional motifs, as the fabrics provide a sense of dignity to the owner, are required to be promoted for meeting the need of mordernization. After independence, tribal arts and crafts have come under the of growing mordernization. As a result, tribals are now capable of producing deligent and attractive bamboo, wood, rud, rope and grass crafts. The Bonda produce beautiful emborided scarves. The Godabas weave pretty loin clothes and the Santals anufacture attractive furniture out of sabai grass. Besides these, several other tribes manufacture excellent leaf plants,which are cheap and attractive. It is necessary to promote tribal arts and crafts based on its unique feature for overcoming the competiton and exploit the nice market which will have the twin advantage

of protecting and preserving the culture and promoting economic condition of the primary produces, artisan weaves from the indigenous tribal community

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THE IMPACT OF INDUSTRIALIZATION ON TRIBAL SOCIETY IN KALINGANAGAR OF JAJPUR DISTRICT

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Abstract

Tribal people of India live in isolated remote areas, endowed with natural resources. In recent period, rapid industrial growth took place in these areas. Industrialization would lead to a better quality of life for the masses. But when the masses are forced-obviously against their will-to shift away from the land that they have lead for generation, 'what kind of welfare' can it bring to them? Due to industrialization the social, cultural and ecological changes have occurred in tribal. The traditional tribal communities who had so far depended solely on agriculture and forests as means of livelihood are now facing the challenge of machine technology. Although tribal who were used to depend upon shifting cultivation and lived like nomads are now setting down. It was found that infrastructural facilities and employment opportunities are better in villages nearer to the industrial centre. Still then it has certain negative impact on tribal society. As a result of industrialization there is a rapid increase in the migration of rural people to urban area. This has posed serious threats to the tribal people.

Keywords : Shifting cultivations, nomads, machine technology, displacement, livelihood

Introduction

The indigenous people of India commonly known as tribal live in isolated remote areas, endowed with natural resources. In recent period, rapid industrial growth took place in these areas. Due to industrialization the social, cultural and ecological changes have occurred in tribal (R. Meher, 2003). The traditional tribal communities who had so far depended solely on agriculture and forests as means of livelihood are now facing the challenge of machine technology. The industrialization has resulted not only in the change in their socio-religious life but also in pattern of settlement and health status (T. Kapoor, 2014). Industrialization, urbanization, deforestation and immigration of non-tribal have resulted in deterioration of ecology (R. Meher, 2014).

Kalinganagar under Sukinda and Danagudi blocks of Jajpur district of Odisha is about 100 kms. from

the state capital, Bhubaneswar and about 30-40 kms. from the district headquarters. The area has a high concentration of scheduled tribes and scheduled caste population. From time immemorial people belonging to Ho adivasi have been living in the Sukinda Valley, which now comes within the district. They developed the wild forest into agricultural field. The Munda and Ho are the first settlers. Since the tribal are exposed to education, they are relatively enlightened than that of their brethren elsewhere in the state. They are primarily agriculturist and have invested their resources in the development of their land. The people are dependent on traditional farming, animal husbandry and forest gathering. The main crops they grow are paddy, a variety of pulses, oil seeds and other food products for their basic needs, those are sufficient. According to the 2011 census Jajpur district has a population of 1,826,275. Schedule

tribes were 0.8% of total population in Jajpur Sadar Block.

Objectives

1. To know the positive impact of industrialization on tribal development
2. To know the negative impact of industrialization on tribal development

Methodology

The study was conducted among fifty people in Kalinganagar of Jajpur district of Odisha. Interview schedule was prepared for the collection of data. Information was collected from primary and secondary sources. This is a descriptive study based on certain explorable research questions.

Positive impact of industrialization

The benefits of urbanization and industrialization should also be taken in to account. Tribal who were used to depend upon shifting cultivation and lived like nomads are setting down. Their children are exposed to better living conditions including education and health care services. Better sanitation means better health to community.

It was found that infrastructural facilities and employment opportunities are better in villages nearer to the industrial centre. The income of the rural population and the consumption expenditure of the tribal households are also higher in these villages.

Positive impacts of industrialization are:

1. They all get the access to the mainstream line of India i.e. education, development, benefits of socio-economic reforms.
2. Access to justice and law of land.
3. Supports and aids from government during any natural calamity and manmade disasters.

Negative impact of industrialization

The first and major impact which tribal faces is in the shape of loss of tribal identity through the establishment of industries. With major tribal tracts being depopulated are herded to new settlements to give space for establishment of factories, tribal are illcase in the new environments. Their customs and traditions come under pressure. Due to the contact

with the town culture that industrialization brings, and consequent urbanization a revolutionary change in the attitude of tribal can be seen. As a result of industrialization there is a rapid increase in the migration of rural people to urban area. This has posed serious threats to the tribal people. Unintended social and cultural consequences resulting in the involuntary displacement of human population, the loss of traditional sustainable livelihood, the marginalization of the local especially the tribal and the increasing environment pollution of the region. Biodiversity loss, drought, noise pollution, water pollution, decreasing water quality, displacement, lack of work security, labour absenteeism, unemployment, loss of livelihood, loss of traditional knowledge practices, culture are the negative impact of industrialization.

The points of negative impact are

1. Lost their inherited land in the name of development
2. Contradiction in govt. words and actions.
3. Rise of Naxalism.
4. Fixed state of their agricultural land.
5. Main focus on mining and natural resources only. Not on the welfare of tribes.
6. Take away many rights and the forest at displaced from ownland.

Conclusion

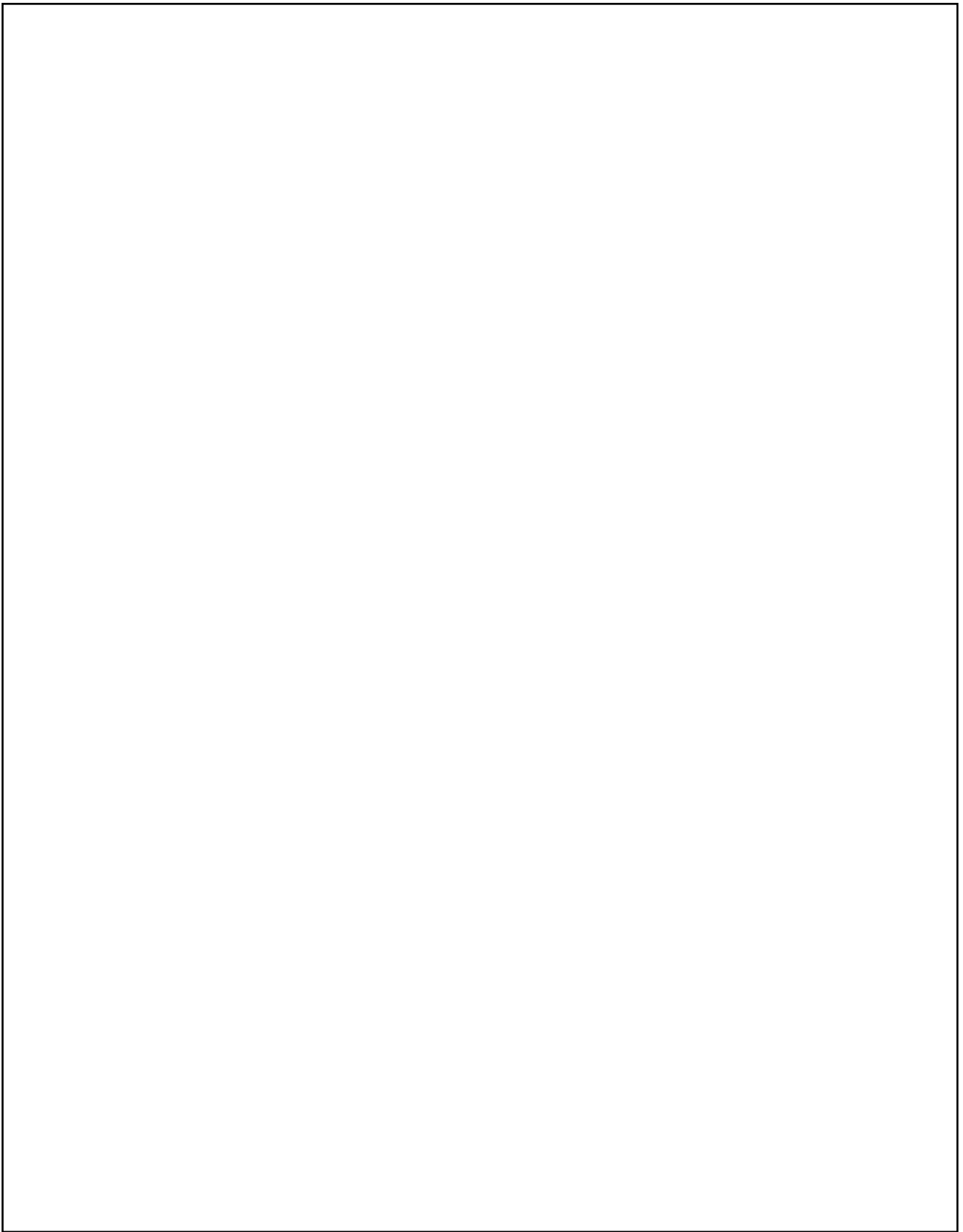
In the post independent India, tribal society has come in contact with the modern industrialized society. The tribal who through thousands of years had formed their own pattern of life are today undergoing changes socially and culturally which has at times posed new challenges. Transition to modernity has been taking place in the tribal society due to cultural, technological, environmental and other factors which are required to be dealt with education, science, compassion and understanding taking the tribal community as an important stake holder for making the development sustainable.

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