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# Primary Education in a Tribal District of Orissa

Dr. Chitrasen Pasayat

**K**alahandi is the South Western district of the state of Orissa adjacent to Madhya Pradesh. Heavy tribal population coupled with poverty, poor health and sanitation, illiteracy and other socio-economic problems are exerting a dragging effect on the economy of the district, which is already lagging behind the remaining districts in the State. Understandably, without their uplift, Kalahandi can never progress. In this paper, an attempt is made to evaluate the status of tribal education in Kalahandi district of Orissa.

## Geography :

Kalahandi can be broadly divided into two natural divisions, viz., the plain lands and the hilly tracts. The hilly tracts are mostly located in its western part covered with dense forest and contain mineral deposits like Manganese, Graphite and Bauxite etc. Timbers and bamboos together constitute a major part of the forest resources. The district is generally characterized by a hot summer and extreme cold in winter.

## Population, Density and Sex Ratio :

According to 1991 census, total population of the undivided district of Kalahandi was 15,91,984 out of which 7,95,935 were males and 7,96,049 were females. But after the formation of Nawapara as a separate district in the year 1992, the present population of Kalahandi is 13,62,162 out of which male population is 6,81,169 and female population constitutes 6,80,995. Although the sex ratio for the State as a whole is not favourable to women, Kalahandi district has a balanced ratio of 1,000. Density of population in district is 135 per sq. km. which is well below than that of the State's average of 202 persons per sq.km.

Kalahandi is a tribal dominated district. According to 1991 census, the undivided district of Kalahandi has 15.92 lakhs people of which 4.95

lakhs are tribal people. It means the population of Kalahandi is about 3.22 times the tribal population. In other words, among every 3.22 persons in Kalahandi, there is one from tribal communities. Though a small district, needless to say that Kalahandi has comparatively more tribal people than many districts namely Puri (1.27 lakhs), Cuttack (1.82 lakhs), Balasore (1.98 lakhs), Dhenkanal (2.33 lakhs), Ganjam (2.97 lakhs), Balangir (3.17 lakhs) and Phulbani (3.22 lakhs) of Orissa. Thus, Kalahandi occupies the sixth rank in having maximum tribal population in the State of Orissa. In terms of tribal density also Kalahandi stands at sixth position with 42 tribal persons per sq. km. The pace of urbanization is very slow in Kalahandi. According to 1991 census only 6.53 per cent of its population reside in urban areas. Bhawanipatna is the only Class II town and there are four Class IV towns namely Kesinga, Khariar Road, Junagad and Khariar in the district. Besides, Kalahandi is one of those districts where the sex ratio among ST population is favourable to women. The district has a sex ratio of 1027 among ST population and it comes next to Ganjam with 1037 in 1991 census.

Undoubtedly, the mountainous and forested district of Kalahandi is ideally suited to tribal inhabitation for centuries. Of the 46 tribal groups found in the district, numerically most important tribes are Kandha/Kondh (Kutia, Dongaria and Desia), Banjara, Paraja, Gond, Munda, Saora and Sabara. Most of them speak their own mother-tongues along with Oriya, the dominant and official language of the State.

## Literacy :

Kalahandi is one of the most backward districts of Orissa in terms of education. There are 350,546 literates including 2,64,650 males (75.5 per cent) and 85,856 females (24.5 per cent) in 1991 census.

The total number of tribal literates in the undivided Kalahandi district is 76,480 of which 65,235 are tribal males and 11,245 are tribal females. The growth rate among tribal literates during 1981-91 was 58.19 per cent. Among tribal males it was 49.00 per cent whereas the growth rate among tribal females was 146.44. Percentage of tribal literacy is 15.44 only out of which male percentage is 26.69 and female percentage is 4.48 only which depicts a very sad picture of literacy among tribal women in Kalahandi.

#### Institutions :

There are 2294 Primary Schools (2200 in rural areas and 94 in urban areas), 348 Upper Primary Schools/M. E. Schools (323 in rural areas and 25 in urban areas) in the district of Kalahandi. It may be noted here that 1025 habitations remain unserved by Primary Schools within easy walking distance of one K.m. and 2002 habitations do not have Upper Primary Schooling facilities within three Km. of distance. There are 1935 Non-Formal Education (NFE) centres functioning under 11 Non-Formal Projects of the district. The number of Primary and Middle Schools per one lakh population is worked out to be 149 and 24 respectively. Besides, eight C.D. Bloks are covered by Adult Education Programme. Six Government Projects comprising 1200 centres and 11 voluntary agencies or Non-Government organizations (NGOs.) with 273 centres operate in the district of Kalahandi. There are 249 Jana Siksha Nilayams for neo-literates in the district.

#### Enrolment :

There are 1.56 lakhs students enrolled in Primary Schools out of which 1.02 lakhs (65.38 per cent) are boys and only 54 thousands (34.62 per cent) are girl students. Significantly, 27 thousands of them are S. C. students (17.31 per cent) and 34 thousands belong to S. T. students (21.79 per cent). Similarly, in Upper Primary level a total of 34 thousands are found enrolled constituting 22 thousands boys (64.71 per cent) and 12 thousands girl students (35.29 per cent). It may be pointed out here that the net enrolment of children in the 6 to 11 age group is 56.67 per cent and in the age group of 11-14 it is 23.84 per cent of the child population of the relevant age group.

#### Teachers :

In 1993-94 academic session, there are 4779 Primary School teachers constituting 4125 male teachers (86.32 per cent) and only 654 lady

teachers (13.68 per cent) in Kalahandi district. Similarly, there are 1632 Upper Primary School teachers constituting 1552 male teachers (95.10 per cent) and only 80 lady teachers (4.90 per cent) in the district. It means the number of lady teachers is very small in comparison to male teachers. However, the ratio between teachers and students in Primary level is 1:33 and it is 1:21 in the Upper Primary level.

#### Case Study :

A study was conducted during 1993-94 under District Primary Education Programme (DPEP) in Orissa to carry out a sample survey of the educational infrastructure and facilities available in the tribal areas. The objectives of this study were also to evaluate the status of teachers in tribal areas including their availability, background qualifications, training, punctuality and problems; to evaluate the status of curricular in operation and the teaching learning materials being used with special reference to use of the tribal language in the writing of teaching learning materials as well as in the class room transaction; to know the status of monitoring and evaluation of primary education including administrative structures, and to evaluate the status of school enrolment and school dropout with special reference to factors affecting enrolment and drop out of tribal girls. The study conducted in ten villages of the Thuamul Rampur C. D. Block in Kalahandi district reveals some interesting findings.

#### Problems :

It has been observed that the economic condition of the tribal people is very poor. Despite their hard work and labour throughout the day, they hardly make their ends meet. In such a situation they cannot think of educating their children in school. Also, the teachers in the Primary Schools and NFE centres are not regular in their duty. Most of the schools are not opened regularly due to teachers' absentism and the passive suppression system. Besides the teachers' absentism, the apathetic attitude of non-tribal teachers is a cause of low literacy among tribal people.

Reportedly the tribal people and their customs, culture, dress, language and behaviour are looked down upon by the non-tribal teachers, educated officers, policemen, forest officers and the like. A number of teachers are found engaged in other occupations. Some of them are money lenders and

some have business. The Anganwadi workers too have failed in achieving the desired result.

Supervision of schools by the higher authority in tribal areas is not satisfactory. Interestingly, in some cases the NFE coordinators have also no proper knowledge about the schools and NFE centres of their own jurisdiction. Lack of proper communication networks is another cause of low literacy among tribal people. There is no all weather road to the remote areas. The ghat road, rivulets, treacherous terrain in the tribal areas are so much so that, it is really difficult for the school going children to attend the school in rainy days.

The school buildings are also not upto the mark. In some of the tribal villages there are no school buildings. There is no healthy atmosphere, where the children can sit for five hours a day and get education. Poor and unhygienic class rooms do not attract the children at all. The books, maps and other teaching aids provided by the Government are not taken care of properly. In many schools there is lack of sufficient school equipment and teaching materials. Books, slates and others educational equipment which are freely supplied to the S.C. and S.T. students by the Harijan and Tribal Welfare Department of the Government of Orissa do not reach them in time.

Schooling time does not suit the tribal children and parents. It directly or indirectly affects the economic life of the tribal people, which cannot be compensated so easily through any other means. Because we cannot ignore the fact that the tribal children help their parents which is a part of their socio-economic life. So they do not find time to attend the school. Thus, children are economic assets to parents in tribal societies. Both the girls and boys assist their parents in various economic and household activities.

Children are also afraid of their teachers. There is a constant fear psychosis of the tribal children as well as their parents for the educated teachers.

Tribal children speak their own mother tongues. For example, the Konds speak 'Kui' and the Parajas speak 'Parji'. The text book language i.e., Oriya is quite different from that of their mother tongues. The language of the teacher is not

intelligible to the tribal children. The non-tribal teachers from outside do not have any knowledge in local tribal language, customs and culture. Besides, the tribal children generally do not understand the abstract concepts and terminology of science and civic science when taught. Even if the parents are ready to educate their children in other languages, they are not regularly taken care of.

Another important point to be noted here is that in tribal society, though a female child is generally treated equally with that of a male child, she is not encouraged to get education. The socio-cultural taboo prevalent among the tribal society obstruct the path of educating girl child. Most of them are engaged in tending goats, pigs, taking care of their younger brother and sister. They also support their mothers in various domestic activities like cooking, fetching water, cleaning utensils, keeping the house clean.

Drinking 'handia' and 'mahua' liquor is rampant among the tribal people. Even the children of about ten to 12 years old also take liquor with their parents as it is a part of their rituals. Thus, drinking creates a barrier on the way of educating tribal children. More importantly, tribal people think that education will not solve their problem immediately. So they do not take much interest in education as it does not give immediate result.

#### Suggestions :

- Various educational officers, supervisors, Inspectors ought to visit the schools in order to make the teaching staff regular.
- Teachers having interest and knowledge on tribal language and culture should be posted in tribal villages.
- Some more incentives such as food, dress, learning materials and stipend etc. should be provided to the tribal children.
- Educated tribal youths must be recruited as teachers.
- There should be a result oriented effective learning process. Work experience and teaching should be hand in hand.
- Girl child should be given more opportunity. Training for girls' education should be separated keeping an eye on their free time.

More Ashram schools may be established in the tribal dominated villages.

Appointment of women teachers to improve the education of the tribal girl child must be realised.

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# Pulse Cultivation in Orissa : Constraints and Remedies

S. K. Sahu

Pulses constitute one of the important components of our daily diet. Pulses are rich sources of plant protein. Pulses may be considered poor men's meat. The daily pulse need of an adult is estimated to be 60g. per day. As such an adult for his balance food annually requires 21.9 kg. of pulse. Orissa having a population of 315 million must require 68.98 lakh tonnes of pulse per year. Unfortunately the annual production of pulse in Orissa varies between 10.50 and 11.50 lakh tonnes. There is a net deficit of pulse between 57.48 to 58.48 lakh tonnes in a year. It is very difficult to raise the pulse production to nearly 5 times of the present production. Attempts are to be made to increase the production to the maximum level. The average productivity of pulse in the State hardly exceeds 5 q/ha. This yield can be doubled through removing the constraints of pulse production. The important pulse crops grown in our State are greengram, arhar, horse gram, cowpea, Bengalgram, and field pea.

## I. Constraints for Pulse production

The low yield of pulses in the state might be due to the following reasons.

(1) Farmers of the State always divert the pulse crops towards waste and degraded lands. These marginal lands are poorly fertile and unsuitable for pulse cultivation. Hence low productivity of pulse in the State.

(2) Pulse crops never grow well in acid soils. Acid soils are rich soluble iron, aluminium and manganese and poor with sweet elements like calcium and magnesium. Native and applied phosphates being held up in the soil are not available to pulse crops. Molybdenum — an essential trace element for pulse crops is highly deficient in these soils. Hence 70 per cent of the soils of the State are acidic in nature and pulse

crops grown in these problem soils do not thrive well and cause low yield.

(3) Pulses are rich with protein and essential aminoacids. Nitrogen plays a key role in the synthesis of protein in grains. As the soils grown with pulse are low with organic matter and available nitrogen, the plant growth is stunted.

(4) Phosphate is highly essential for root growth and seed setting in the pods. Acid soils being low with available phosphate do not support for growth of all the pulses.

(5) Pulses require potassium for production and translocation of carbohydrates to storage organs. Potassium protects the pulse from stresses like drought, diseases and pest. Pulses like arhar, cowpea and field pea cultivated in light textured soils suffer from potassium deficiency due to loss of this nutrient through leaching.

(6) Rhizobium bacteria supplement nitrogen to pulse and build up soil fertility. Lack of appropriate Rhizobium strain as well as their population in the soil cause poor growth of pulses.

(7) Molybdenum, an essential element required in traces for fixation of nitrogen by symbiotic Rhizobium bacteria is deficient in our soil and not provided externally by the farmers.

(8) Suppression of growth of kharif pulses occurs due to weed competition in the field.

(9) Cultivation of local varieties of pulses over improved and high-yielding varieties cause low yield.

(10) Summer pulses fall under moisture stress.



(11) Preventive measures for control of the pulse diseases like leaf spot in green gram, black gram, horse gram and cowpea; yellow mosaic diseases in green gram, black gram and cowpea; wilt in arhar; blight, rust and collar rot in Bengal gram; powdery mildew in field pea, cowpea and black gram are not attended by the farmers. These diseases cause seedling mortality and suppression of plant growth.

(12) Pest menaces such as pod borer and blister beetle in arhar, leaf eating caterpillar and agromyzid in green gram and black gram and aphids in cowpea cause serious damage to pulses.

## II. Technology for Increasing Pulse Yield

Improved technologies have been evolved by the agricultural scientists for boosting pulse production in the State. Although deficit of 58.48 lakh tonnes of pulses cannot be met so soon, the present level of productivity can be raised two fold through adoption of improved technologies. The key messages of these technologies are listed below.

(1) Orissa cultivates 20.67 lakh hectares of lands for both kharif and rabi pulses. Also there is scope for horizontal expansion of pulse area. There are 29.66 hectares of uplands and 19.30 lakh hectares of medium and 15.23 lakh hectares of low lands under cultivation. These lands can be put to different pulses either under cropping system or under pyra crops. Intercropping of pulse with cereals would also expand the area.

(2) Selection of right type of lands befitting to specific pulses increases the yield. Horse gram can grow well in marginal lands. Slopy lands are to be engaged for kharif cowpea sown against the slope. This methodology not only checks soil erosion but also builds up soil fertility. Degraded lands having sub-soil depth can be put to longer duration of kharif arhar. Bengal gram and field pea can be sown in lowlands after harvest of kharif paddy.

(3) The soils of Orissa are classified into eight broad groups. All the soil types are not equally suitable for each pulse. Pulses should be chosen according to their adaptability to soil type. Red and lateritic soils are suitable for arhar and cowpea during kharif season and horse gram can be put in these soils as post monsoon crop. Bengal

gram, field pea and green gram are to be sown in black soil with residual moisture. Black gram grows well in the medium textured mixed red and black soils. Alluvial soils of coastal districts are suitable for pre-rabi black gram and green gram. Saline soils are not suitable for pulse crops.

(4) Nearly 4.9 million hectares of acid soils of the State can be made fit for pulse cultivation through amelioration. Pulses grow very well in neutral soils. Acid soils can be made neutral through application of lime at 1.0 to 2.0 T/ha. The cheap sources of lime are paper mill sludge, dolomitic lime stone and pressmuds from sugarcane industry. Liming increases soil PH, provides calcium and magnesium to pulse, increases the availability of native and applied phosphorus and molybdenum. Liming detoxifies the adverse effects of iron, aluminium and manganese. The population of Rhizobium bacteria increases at the rhizosphere for fixation of atmospheric nitrogen.

(5) With non-availability of lime, mixture application of single super phosphate and rock phosphate at 40 kg. P<sub>2</sub>O<sub>5</sub>/ha. with equal proportion (50:50) on basis of phosphate should be placed behind the plough for better utilization of phosphate and calcium in acid soil. In absence of water soluble phosphates in soluble rock phosphates at 80 kg P<sub>2</sub>O<sub>5</sub>/ha. is to be broadcast with first ploughing and seeds are to be sown two weeks after application. In limed soil rock phosphate is to be avoided. In such soils any water soluble phosphates are to be placed behind the plough at the time of sowing seeds.

(6) Various pulse crops although remove 60-100 kg N/ha, it is customary to apply sub-optimal doses of nitrogen and potash to pulse. A starter dose of 20 kg N/ha is to be applied at sowing. The nitrogen demand of pulse is met through atmospheric fixation by Rhizobium bacteria.

(7) Seed inoculation of appropriate rhizobium strain to special pulse needs to be taken up. Seeds required for sowing one acre of land (8-10 kg) should be inoculated to 200 kg of bacteria culture preparing a suspension with 400 ml water. Inoculated seeds dried under shade for 15'-20' are sown in the field. Rhizobium inoculation gives 20-30 per cent increase in yield and enrich the soil adding 50-80 kg N/ha.

(8) Seed inoculation along with molybdenum treatment further increases 30-40 per cent higher yield. Ten gram of ammonium molybdate mixed with rhizobium suspension is inoculated to the seeds required for one acre. Molybdenum inoculation enhances nodulation and increases nitrogen fixation.

(9) Intercropping of two rows of black gram or green gram in between 3 rows of arhar, or in between two rows of sugarcane and one row of cowpea in between two rows of maize or jowar would add extra pulse yield.

(10) Sequence crops should accommodate one pulse crop. Suitable kind of pulse and its variety should be chosen in crop rotations depending on the available soil moisture and the climate for pulse cultivation.

(11) Pulses in the cropping sequence are much benefitted to application of full amount phosphate required for two or three crops to the single crops of the rotation.

(12) At present high yielding varieties of various pulse crops have been evolved for cultivation. Low yielding local genotypes are to be substituted by the high yielding genotypes. The important high yielding genotypes of pulses suitable for particular soil and climate have been tested at Research Stations of the state. They are Dauli, Sujata, Jyoti, K85, PDM 54 and TARM for green gram, T-9, Sarala, PDU for black gram, S-5, UPAS-120, Pragati and Jagruti for arhar, SEB-2,

Swarna and FS-68 for cowpea, Radhey, JG-62 & Annegiri for bengal gram, Urmi for horse gram and G. C.-66, EC-33866 and T-163 for field pea.

(13) Seed treatment with carbendazium at 1.5 kg./ha. seed before sowing controls many fungal diseases of pulse crops.

(14) Maintaining appropriate plant population ensures higher pulse yield.

(15) Weeds are menace to kharif pulse. Weeds in green gram and black gram are controlled by application of butachlor or thioebncarb at 0.75 kg./ha. one day before sowing seeds. Weeds in arhar field can be controlled by pre-emergence foliar spray of fluchoralin at 1 kg./ha.

(16) Pod borers are the serious pests of most of the pulses. Control of pod borers doubles the pulse yield. Foliar spray of endosulfan 35 EC at the rate of 1500 ml./ha. at 15 to 20 days interval commencing from pod initiation controls the borer infection.

Adoption of the above technologies for pulse cultivation can bridge up the gap between demand and production of various pulses.

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# Tribal Development Cooperative Corporation Ltd. — Recent Development and its Revamping

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The TDCCOL was constituted in 1973 for furthering social and economic development of tribal community, eliminating exploitation of tribals by the unscrupulous middle-men and traders. It works as the apex Co-operative so far as its protective function and co-operative mobilisation are concerned. Its basic objectives, however, are enumerated as follows :

- To procure surplus agricultural produces and minor forest produces from the tribals at a fair and remunerative price and arrange for their marketing.
- To supply essential commodities to the tribals at fair price.
- Arrange for processing of procured commodities to add value to the product with a view to increasing profitability and thereby providing employment to them.
- Advancing for consumption-cum-production loan to the tribals to meet their resource requirements for raising crops and also for meeting their consumption needs.

The authorised share capital of the Corporation is Rs. 20.00 crores, against which the paid up share capital as on 31-3-1994 is Rs. 12.63 crores as detailed below :

	Rs. in crores
(i) Government in Welfare Department	11.42
(ii) Government in Cooperation Department	0.49
(iii) Cooperative Societies	0.02
(iv) Panchayat Samities	0.30
(v) Government in Welfare Department, participation in P.S.F.S. Schemes	0.40
	Rs. 12.63

For implementation of these objectives as per organisational set up, the TDCCOL has three divisions with headquarters situated at Berhampur, Sunabeda and Keonjhar. Under Berhampur Division, there are four Branches viz., Baliguda, Parlakhemundi, R. Udayagiri and Nayagarh. Under Sunabeda Division there are seven Branches, viz., Sunabeda, Jeypore, Rayagada, Umerkote, Muniguda, Kasipur and Bhawanipatna. Under Keonjhar Division, there are four Branches, viz., Keonjhar, Sundargarh, Lahunipada and Udala. Thus there are fifteen Branches spreading over tribal concentrated areas in the State. A Branch Manager being in charge of a Branch, looks after all its operations. Besides, at least ten other staff are provided to assist the Branch Manager. The TDCCOL has 202 Large Size Multi-Purpose Cooperative Societies (LAMPCS), 35 other Primary Societies and 47 Panchayat Samities comprised within its jurisdiction. The General Body and the Managing Committee of the TDCCOL over-see its working.

Under Surplus Agricultural Produces (SAP), following items are being procured and marketed by the Corporation over the years. (1) Niger seed, (2) Mustard seed, (3) Gingelly, (4) Ground nut, (5) Blackgram, (6) Horse gram, (7) Katting, (8) Long bean, (9) Maize, (10) Jowar, (11) Ragi, (12) Turmeric, (13) Hill gram, (14) Green gram, (15) Red gram, (16) Rice, (17) Round beans, (18) Caster seed and (19) Soyabean.

Under Minor Forest Produces (MFP), the Corporation is dealing in the following items, (1) Seeded tamarind, (2) De-seeded Tamarind, (3) Mahua seed, (4) Kusum seed, (5) Neem seed, (6) Karanj seed, (7) Sal seed, (8) Harida, (9) Nux-vomica, (10) Sikakaya, (11) Hill Broom(b), (12) Hill Broom(s), (13) Dry Siali leaf, (14) Stitched Siali leaf, (15) Kusumi lac,

(16) Chargum, (17) Bahada, (18) Amala, (19) R.S.Root, (20) Sunari bark, (21) Siali leaf plates, (22) Sal leaf plates, (23) Dhanga gum, (24) Gunduli gum, (25) Mahua flower, (26) Broom grass, (27) Gamaried seed, (28) Bahada, (29) Thorn Brooms, (30) Gums, (31) Mushrooms, (32) Gum Khelua Creper, (33) Merisinga lenres, (34) Soap nut, (35) Sabai grass and (36) Bhuin neem.

During the last ten years, business turnover of the Corporation stands as given below :

Year	Rs. in lakhs
1984-85	530.00
1985-86	618.47
1986-87	473.34
1987-88	582.59
1988-89	737.23
1989-90	361.50
1990-91	1061.49
1991-92	1335.58
1992-93	752.75
1993-94	696.73

With the establishment cost of the Corporation being Rs. 1.40 crores annually, the Co-operative organisation meant for the weakest section of the society, the tribals could not reach a viable level owing to various genuine and unavoidable constraints, not to speak of making allowance for the social cost. A bleak and unhappy picture cannot be brushed aside when in the year 1992-93, it has sustained a cumulative loss of Rs. 27.35 crores and overhead charges go on increasing every year. It could not make any profit ever since its inception. Whatever the reasons of non-performance may be, the most important aspect is to increase its business turnover at least up to Rs. 15.00 crores by tapping the available potential, so as to reach the break-even point as is evident from market situation. More of business will give rise to more profit and more profit would lead to better management and attainment of viability. Because of the fact that it is paying Rs. 2.00 crores every year towards interest on loans received from the banks the viability is not reached. Against the disproportionate burden on staff salary for about 500 employees and other allowances/expenses, the Government in Welfare Department is giving a grant of Rs. 20.00 lakhs towards managerial subsidy which account for only fifteen per cent of the requirement. Time and

again the TDCCOL is making out a case and demanding reimbursement of managerial cost in the lines of Girijan Cooperative Corporation of Andhra Pradesh and the Cooperatives of West Bengal and Maharashtra. The Committee on Welfare of SC/ST of Orissa Legislative Assembly in their 8th and 12th reports have recommended being convinced on merits. But, the matter is still under consideration of Government, apparently owing to general resource crunch.

In the year 1990-91 and 1991-92, the TDCCOL has sustained a loss of 10.62 crores, by implementing Government's policy directives, in Mohua flower trading only. As much as Q. 22,425.05 was damaged and there was a shortage Q. 37,892.75 in the item. The matter for releasing Rs. 10.62 crores as a one-time grant, just to recoup the loss due in any view of the matter but still awaits finalisation by Government to the great detriment of TDCCOL interest under delay.

Like its counterpart Girijan Cooperative Corporation of Andhra Pradesh it has moved the Government for exemption of royalty payable to the Forest Department on lease of Minor Forest Produce items to it. Since every year it goes on paying royalty at increased rates, i.e., ten per cent increase every year, which comes about Rs. 71.00 lakhs this year, the position goes from bad to worse. The Committee on the Welfare of SC/ST in their 8th report have recommended exemption of forest royalty from TDCCOL trading. Similarly, exemption from paying sales tax on its trading in the lines of Tribal Cooperatives of Andhra Pradesh is another area of concern deserving special attention. By accommodating these rationally sound proposal already prevailing in neighbouring states the TDCCOL could attain a self-sustaining status.

A review of the position of the Corporation reveals as follows :

Its assets and liabilities are mostly in shape of office buildings, 66 godowns, staff quarters etc. In the debit accounts, it has huge bank loans outstanding, thereby rendering other financial institutions unwilling to give further loan. In consequence, the TDCCOL is unable to carry out its trading as envisaged with the promised resources. Therefore, the procurement at present is virtually being carried out only on forward

sale/tie-up basis. To explain, in forward sale the party in whose favour the tender is knocked down will deposit the entire funds including the cost of commodities, purchase tax, sales tax, forest royalty etc. with the TDCCOL in accordance with the agreement made. Then the employee of the Corporation will procure commodities from the fields and give out to the party. Here the TDCCOL will in fact trade with the funds of the private party. But, in tie-up arrangement, the party will deposit the differential cost of the commodities as per the agreement with the Corporation. The employees of the Corporation will have no work except issuing permit for lifting stocks and watching the total quantities on which increase/decrease of differential cost depends. Here the party will virtually do all the trading work. Then, what is the use of keeping so many employees without any work or with a small work? This is definitely not a healthy system as far as the purpose of the TDCCOL is concerned.

Against such financial back drop, it can ill-afford to allow its 500 employees either to sit idle or to work in the way detrimental to the interest of the Corporation. Extending further service benefits to its employees is a costly proposition under the above circumstances. The ban on further appointment imposed by the Managing Committee is the only course open under the austerity measure of the Finance Department. Purchase of new vehicles, reckless use of telephones, expenditure on contingencies and allowing admissible shortage on various commodities, misappropriation of Corporation money and other wasteful and unproductive expenses should be stringently monitored so as to prevent and stop forthwith. It is desirable that a Minister of the State Government should be invariably kept as President of the Corporation so as to effectively exercise austerity and save expenditure on honorarium, travelling expenses, telephone, petrol, oil and lubricants, hired accommodation and other expenses etc. Since the Minister is already in enjoyment of all sorts of such benefits from the Government in Parliamentary Affairs Department, the Corporation will have a sizable saving thereby.

The idea that officers borne in the Corporation have better sense of workmanship, team spirit, accountability etc. for the Organisation than the administrative officers coming on deputation, is an ill-founded one. Previously, the Corporation had Orissa Administrative Service-II Officers as

Branch Managers. Very seasoned and Senior Indian Administrative Service Officers were kept in-charge of Managing Director and President of the Corporation, having proper appreciation of its work load/importance. Now, it is being run by its own staff fully, except the President, Managing Director and three Divisional Managers. In stead of making profit, it goes down by incurring heavy losses over the time. Both the past activities, history of TDCCOL and its officers will account for the cumulative loss over the years. An Organisation carried on despite intermittent corruption and malpractices. Many of the Field Officers with proven efficiency, track record and integrity should be brought to join the Corporation on deputation basis over and above the good officers showing results at present. With deputation of officers from General Administration, Revenue, Cooperation, Finance Departments of Government, the Corporation keeps on moving as a growing and living entity. It will have more exposure, interaction, better outlook and profits at the hands of capable and dynamic officers.

All the more, the employees are to rededicate themselves to work for the viability of the Corporation not in a perfunctory way, but in a systematic/comprehensive way conducive to its growth. The stigma that is attached to the Corporation for its lack lustre performance to the effect that there is large scale corruption and hushing up in it has to be wiped out from the minds of public by dint of hard work and visibly concrete demonstration business-like spirit. The idea that "because it is a thing of the Government, it hardly matters, if it is dumped in the ocean"; has to go by scrupulous accountability. Everybody should think that loss of the Corporation means loss to him, to his family. He is a watch-dog so far as interests of the Corporation is concerned. Survival of the Corporation is first and foremost, then, is the Union. The officers with charges of misappropriation/shortage are to be dealt firmly and quickly by launching disciplinary proceedings and criminal prosecution. All sorts of political interference in dealing with cases are to be avoided. Rights are conceived only if duties are performed. A kept-in-check look to the working of the Corporation may be made right here and now. Even tomorrow will be late.

Private Secretary to  
Minister of State, Handicrafts and  
Cottage Industries, Bhubaneswar.

# Environmental Activity Desiderata

Sashi Bhushan Rath

## PREAMBLE :

Presentation of a desideratum doesn't imply that the necessary environment lacks the recommended features rather the desiderata also serve as a concept package for the empiric evaluation of actual status as a step towards improvement attempts so that the capacity is upgraded to protect the environment we live in.

## EARTH IN THE BALANCE :

Environmental conservation has been the most talked about thing these days. The awareness has reached the present stage over the past 40 years. The root of the problem is violence, the latent instinct in men which has reflected in many ways viz. abuse of basic human rights, lack of genuine concern for the poor, social and political strife, racial and religious intolerance, armament and gun factories etc.

Arnold J. Toynbee's apt remark is relevant in this context. He said, "Technology is the magic that grinds out wealth and power and human beings rush to buy wealth and power at any price". Technology "at almost any price" is surely going to affect the nature. It is essential to strike a balance between technology and conservation, a balance between material aspiration and spiritual. If adequate care is not taken then further degradation shall take place which will only be precursor to spiritual and cultural death of India or any country whatsoever.

Human life and work can not be thought of without an environment. The physical, chemical, biological, social, psychological factors in environment play an important role in the normal functioning of man. When these factors exceed certain limiting values there occurs undesirable effect in the basic living of man. Reciprocally man

too is an environmental factor with respect to other members of an eco-system.

By-products of industry, use of chemicals against pests, mosquitoes, removal of overburden of mining etc. may appear to be against environment but in favour of economic progress; therefore what is called for is a responsible management of earth's resources, striking a right balance between conservation and development.

We are all concerned with the question whether (or perhaps when) man must design and adapt to steady state conditions (with maximum ability to resist perturbations) and at the same time avoid the ageing state. In the short history of man-on-earth there has been succession of growth states and now that there might be "limits to growth" in man's world is a new, and, to many people, almost unthinkable.

Mankind can do almost anything he puts his mind to, provided he does not break natural laws in the process. Man must overcome his belief of being dominant over nature. He needs to work with the nature's forces rather than against them. Technology supplies the tools but it is man who has to apply these tools for the benefit of environment and his future.

It is necessary for us, as the wise custodian of this frail earth, to recount how our ocean and atmosphere came into being. Berkner and Marshal have described that it is not by men but by micro-organisms. Over long periods of time, have largely controlled the chemical compositions of the sea, likewise for the atmosphere. The earth's original atmosphere, as derived from purely geological processes, contained little or no Oxygen and much Carbon dioxide until green plants began releasing the former and removing the latter. As a

dependent heterotroph (means nourished by others in contrast to autotroph which means self-nourishing) man can't alone control the bio-sphere for his own good; he must have the cooperation of the micro-organisms of the soil and water, bacteria, other autotrophs and many other organisms. Organisms, which are mostly invisible, work for the good of man and nature; these are adaptable, tough and composed of living protoplasm vulnerable to poisons as man himself. Too often man works to obtain temporary advantage by increasing flow of materials but forgets to arrange for return mechanism by branding as uneconomical.

**BIONOMICS :**

A change in public attitude towards the environment began first in the affluent countries but is now slowly spreading to the less developed countries as political leaders began to realise that it is in the best interest of each country, large and small, be concerned with the big picture as well as with internal problems.

Environmental principles contribute to achieving a mature balance between the systems of man and the systems of the nature in such a way that quality controls the quantity and human values are not sacrificed on the alter of technological advancement. Integration of man and nature is of crucial significance. Integration is much more than a sum of the parts. It should not be forgotten that mere sum of trees does not make a forest.

Beneficial use of resources is the net benefit of "good" resources (environment-friendly) and "bad" resources (pollutants). Bionomics is a kind of expanded economics that includes cost accounting of the works of nature as well as the works of man. Literally bionomics mean "management of life" is derived from the same root (nomic; management) as economics (basically means management of the house).

**POLLUTANT SO MANY :**

Many economically important human activities emit gaseous pollutants into the air. Some of these are highly stable and continue to reside in the atmosphere for decades. even centuries e.g.

Name	Residence (in years)	Annual growth rate (in %)
Carbon dioxide	3	0.50
Nitrous oxide	150	0.25

Methane	11	1.00
Chloro fluoro carbon (CFC-11)	75	7.00
Chloro fluoro carbon (CFC-12)	111	7.00
CFC-113	90	17.00
Halon-1301	110	20.00

Every molecule of CFC warms up the global temperature 10,000 times more than a molecule of Carbon dioxide. USA, Canada, Norway, Sweden etc. have banned the use of CFC as thses spoil the Ozone layer, damaging the "greenhouse effect" on earth. Discovery of atmospheric holes has alarmed the scientists. Halons, primarily used in the fire extinguishers, damage the Ozone layer 0.10 times more destructively than the CFC. CFC is used as refrigerator fluid since 1928.

The word "pollution" is derived from a Greek root meaning defilement. Preston Cloud defined pollution as an undesirable change in the physical, chemical or biological characteristic of air, water or land that will be, or may be harmful to human and other life, industrial processes, living conditions and cultural assets.

**A. EFFECTS OF AIR POLLUTION :**

1. Impairs physical properties of atmosphere by adversely affecting its visibility, transparency and precipitating the cloud due to hygroscopic nature of pollutant materials.
2. Damages through abrasion, chemical attack, indirect chemical attack and electro-chemical abrasion.
3. Visible and invisible impact on vegetation like stunted growth, morphological pigmentation.
4. Increases mortality among domestic and livestock animals.
5. For human beings air is essential for the sense functions. One can live without food for 5 weeks, without water for 5 days but without air for only 5 minutes.

**B. EFFECTS OF WATER POLLUTION :**

Environmental Protection Agency (EPA) under National Interest Primary Drinking Water

Regulations (1975) has classified the various water pollutants and their maximum permissible level :

Water pollutant	Maximum permissible level (mg. per litre)
<b>1. Inorganic chemicals</b>	
Arsenic	0.05
Barium	1.00
Chromium	0.05
Flouride	1.40 to 2.40
Lead	0.05
Mercury	0.002
Nitrate	10.00
Silver	0.05
<b>2. Organic chemicals :</b>	
Endrin	0.0002
Methoxychlor	0.10
<b>3. Radioactivity (Pico-Curie unit per litre) :</b>	
Gross Alpha	15.0
Radium 226, 228	5.0
Tritium	20.000
Strontium-90	8.0
<b>4. Bacteriological</b>	
Coliform Bacteria per 100 ml.	1.0

#### C. EFFECTS OF SOUND POLLUTION :

According to the International standards the noise level should not exceed 45 decibels (dB). Beyond permissible limits noise too have harmful effects like hormonal imbalance, migraine, fatigue, psychic disorders etc.

Based on laboratory data scientists have discovered the following effects on the human beings :

- 50dB-Comfortable hearing
- 80-90dB-Headache, muscular fatigue, blood vessel contraction, increases heartbeat.
- 90-100dB-Impairment of visibility and hearing.
- 100-140dB-Memory loss, madness.
- 155 dB-Wrinkles, ageing.
- 180 dB-Death

#### D. EFFECTS OF MINING ACTIVITIES :

The basic complaints of environmentalists against open cast mining are that such mining :

1. Disfigures the landscape not only by excavation but by creating huge dumps of vegetation and overburden.
2. Pollute the atmosphere with dust and noise.
3. Contaminates the ground as well as the surface water caused by effluent-tailing ponds.
4. Destroys forests, thereby causing disappearance of birds and wildlife from their natural habitat to elsewhere.
5. Displaces native tribals who are most often the ancient residents of the forests.

#### E. POLLUTION IN MINE :

##### (a) Water pollution :

1. Effluents from ore beneficiation plants, waste dumps/tailing lines.
2. Spent water from ore handling plant.
3. Removal of accumulated more water often toxicated by explosive chemicals and other solids.

##### (b) Air pollution :

1. Mining activity linked with gaseous explosive pollutants like Sulphur dioxide, Carbon monooxide, Oxides of Nitrogen etc.
2. Suspended materials like mineral dust Silica etc. originating from drilling, crushing, automobile, mining machinery exhausts etc.

##### (c) Noise pollution :

1. From fixed plant and machineries of mineral beneficiation plant, conveyors, compressors etc.
2. From moving sources like shovels, dumpers, drills, dozers, trucks, front-end loaders.
3. From sudden noise like blasting.

#### F. DETERGENT THREAT :

Many detergents are made of complex chemicals which cause dermatological toxicity and are environmental threat too. The researchers at Karnataka University have inferred from a study that 80% of infant skin problems were cured by avoiding detergents to wash napkins. Unsafe formulation of synthetic detergents (SYNDET)



often give rise to dermal effects. Studies undertaken by Industrial Toxicology Research Centre (ITRC), Lucknow also reveal that the synthetic detergents in cloths and crockery need to be washed, for clothes (20 to 23 times) and for crockery (11 to 13 times) to make them free of detergents. As per ITRC study in a detergent factory, dermatitis is spread from worker's hands to other parts. Worker's exposure to related chemicals of SYNDET like caustic soda, potash, oleum, sulphuric chloro hydrin, ethelene oxide etc. also cause irritation in respiratory tract, asthma, laryngitis and allergies. The desired qualities of detergent are good detergency or washing efficiency, adequate dispersing and emulsifying properties without damage to the fabric and human beings.

#### THE BASIC STRATEGY :

Any strategy of evolving actions towards environmental protection, the following non-exhaustive points are to be kept in mind.

1. Shortage of resources to be adjusted against economic & social mal-distribution.
2. Basic human needs are: food, shelter, clothing, health & education. Any activity of development must protect the needs.
3. World statesmen are to direct the new system to match the "Inner limits" of the basic human needs without violating the "outer limits" of the planet's resources.
4. Environment is highly inter-connected viz. people, resources, development & many others; so action to solve one issue may affect the other.
5. Environmental management is to be flexibly planned to cope with the uncertainty which may come up; as such for general development strategy alternative patterns should preferably be prepared side by side.

We must be careful with the word "stability" since it means different to different people. The physical scientist measures it in terms of resistance & perturbation i. e. a system is stable if it returns quickly to equilibrium when disturbed by an external agency. It is called structural or neighbourhood stability.

The environmental scientist sees the stability in the time-related scene i.e. a system is stable if its structure and function remain almost the same over the years.

Ultimately however the survival or the life of the system is governed by these perturbation-related or time-related fluctuations.

The natural tendency of nature is to diversify but when it reduces the energy-efficiency it contradicts the current strategy of man and a conflict grows between man and nature. It becomes a matter of concern to what extent it is necessary or desirable.

#### A BOLD STEP AHEAD :

UNESCO in 1973-74 initiated the MAB (Man and the Biosphere) programme adopted by India in 1983.

The Indian region (8—38 N & 60—97.5 E) with a total area of 328 million Hectares is rich in biological diversity. It is estimated that there are around 65,000 species of animals including mammals, around 45,000 species of plants, around 15,000 species of vascular flora (vegetation cover), around 50,000 species of insects, 4,000 species of molusks, 6,500 species of invertebrates, 2,000 kinds of fishes, 1,200 kinds of birds, 420 species of reptiles, 340 species of mammals, 140 species of amphibians.

Idea of conservation is not a new one for India. Ancient Indian literature has emphasised the conservation of flora and fauna. Above all the Ashokan edict also bears ample testimony.

This step taken by the UNESCO and our country has started bringing about good dividends through change in the psyche and creative activities like animal libraries, river and lake saving activities, love for sanctuaries, afforestation (list of trees in Indian context, Annexure-I) etc.

Basing on the standard criteria for selection by UNESCO the Indian National MAB Committee identified the following sites as protected biosphere reserves :

Reserve	State(s)
Nilgiri	Tamil Nadu, Krnataka & Kerala
Namdapha	Arunachal Pradesh

Nanda Devi	Uttar Pradesh
Northern	
Andamans	Andaman & Nicobar Islands
Gulf of Manor	Tamil Nadu
Kaziranga	Assam
Sunderban	West Bengal
Thar Desert	Rajasthan
Mannas	Assam
Kanha	M. P.
Nokrek	Meghalaya (Tura Range)

Projects recommendations specifying boundary, structure and management have been submitted for the above mentioned first four reserves.

#### POSTSCRIPT :

Different ways in which nations perceive their environmental problems and eventually tackle them is determined by the characteristics of their individual political system. L. J. Landquist stresses the "politicalness" of the environmental issue : "It is not by trying to get into the fields of engineers, scientists, ecologists or philosophers that we can make most important contributions. Proposals for change must be based on careful empirical analysis of the political effects of the environmental politics and policies."

Basically two models of regulation exists and their characteristics are as follows :

The American model — Emphasises adherence to standards, constant monitoring of standards, strict schedules. Public and Press keep a surveillant eye over the environment protection agency (Watch the Watch dog). Bureaucratic power is limited by standards, schedules and public litigation.

The British model — Assumes that several constraints are faced by the political system as well as by the industry and therefore environment considerations are to be put into the proper perspective. It does not prescribe strict standards or schedules. It relies on the local implementors to arrive at "most practical and feasible solution."

In other words American model is process-oriented whereas the British model is result-oriented. Most administrative models adopted by India and other Third World Countries lie somewhere in the spectrum of American model being at extreme right and British model at extreme left. More specifically in India

environmental regulations follow British pattern whereas the implementation style follows American model. As a result, our system inherits not only the strengths but also the weaknesses of both models.

There is need for a revolution in mankind's thinking, as basic as the one introduced by Copernicus who first pointed out that the earth was not the centre of the Universe. For shaping the future our mind-set is to be changed i.e. the paradox of thinking absolescence and living in rapidly changing flux is to be cleared because this paradox puts us in collision with the future. It is the responsibility of "you" and "I" to save and shape the future. Technological advances and improvements in the quality of life should be complimentary to each other. Technology should not merely strengthen the arms of industrialists of nation. It has a far greater role to play.

A new ethic is to be imbibed. Kiniteness of resources, life, crises, life-supporting systems etc. are to be kept in mind and from this "new political man" is to emerge. Voting regularly is not enough. Individual involvement in political and environmental issues will be essential part of the emerging new ethic.

*"O Earth, whatever we dig out from you, must that have to be filled up again and restored as fast as possible. O Pure One, we do not intend to hit you at your heart of hearts."*

(Atharva Veda 12/1/35)

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## ANNEXURE-I

## NAMES OF TREES FOR AFFORESTATION

Sl.No.	Common Indian Name	Botanical Name
1.	Acacia (Kikar)	Acacia Nitotica
2.	Amla	Phyllanthus Emblica
3.	Ashok (Ashok)	Polyalthia Longifolia
4.	Arjun (Arjun)	Terminalia Arjuna
5.	Bael (Bel)	Aegle Arjuna
6.	Banyan (Barh)	Ficus Benghalensis
7.	Bougainvillea (Boganvila)	Bougainvillea Spectabilis
8.	Cashewnut (Kaju)	Anacardium Occidentale
9.	Casuarina (Suru)	Casuarina Equisetifolia
10.	Chakundi	Cassia Siamia
11.	Drumstick (Saijan)	Moraiga Delifera
12.	Eucalyptus (Safeda)	Eucalyptus Hybrid
13.	Flame of Forest (Palas)	Butea Monosperma
14.	Gambhar	Gamalina Arboria
15.	Guava (Amrund)	Psidium Gualava
16.	Gulmohar (Gulmohar)	Delonix Regia
17.	Imli	Tamrindus Indica
18.	Jackfruit (Kathal)	Artocarpus Heterophyllus
19.	Jamun	Eugenia Jambolana
20.	Jujube (Ber)	Ziziphus Mauritiana
21.	Krishnachuda	Poisiana Regia
22.	Mahua	Bissia Latifolia
23.	Neem (Neem)	Azadirachta Indica
24.	Pangam (Karanja)	Derris Indica
25.	Red Silk Cotton (Simul)	BomfaxCeiba
26.	Sal	Shorea Vobusta
27.	Shishum (Sisso)	Dalbergia Sisso
28.	Teak	Tectona Grandis
29.	Thuja (Morpankhi)	Thuja Compacta
30.	Pipal (Pipal)	Ficus Religiosa

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# Tasar Silk : The Pride of Orissa

Prafulla Kumar Mohanty

Silk, the best known natural fibre in the world, is used as a luxurious garment since time immemorial. Its lustre, texture and sleeky nature, in fact, attracts the attention of almost all human beings of present civilisation. India is the only country in the world where four varieties of natural silk such as Eri, Muga, Mulberry and Tasar are available. Orissa in particular is proud of producing the highest quantity of Tasar silk in India next to Bihar. Silk cultivation and silk industry are although very ancient in Orissa, is highly speculative since it engages a handsome number of people in various ways.

## TASAR CULTURE IN ORISSA

Orissa embraces a large quantum of tusar flora and fauna. Tasar culture is now being carried out in four geo-physical regions of Orissa such as Northern Plateau (Mayurbhanj, Keonjhar, Sundargarh), Central river basin (Dhenkanal, Sambalpur and Balangir), Eastern Hills (Phulbani, Kalahandi, Koraput) and Coastal plains (Cuttack, Balasore and Ganjam). Interestingly enough, this practice has been a regular phenomenon in all districts of Orissa excepting Puri.

The manufacturer of the tasar silk is a small caterpillar like creature called "tasar silk worm" It is of two types, i.e., *Antheraea mylitta* and *Antheraea paphia*. *A. mylitta* is reared in natural forests located at a lower altitude (50-300 m. ASL) and feeds on food plants like Asan and Arjun. This cultivation is practised for three crops in a year in different seasons. First crop is the seed crop practised during rainy season (July and August) for about a month, the second crop cultivated during autumn season (September and October) for 35 days is the 2nd seed crop for the next crop to be carried out during winter season (November-January) for about 45 days. Winter crop is not possible at some places where winter is earlier and severe. In that case the crop is the

commercial crop and practised for about 45 days.

*A. paphia* is a wild variety at a higher altitude (600-100 m. ASL), feeds on leaves of sal plant and can produce three times more silk than *A. mylitta* only during rainy season. *A. paphia* can also be reared at a lower altitude which produces a different type of cocoon (Bogai cocoon). However, Bogai cocoon produces 1.5 times more silk than *A. mylitta*. As a result tasar rearers prefer to rear Bogai during autumn season. But it is a matter of great regret that the population of *A. paphia* is decreasing day by day due to depletion of natural forest. The eco-geographical condition provides a congenial environment for the population of these tasar silk worms.

## TASAR CULTIVATION OF ORISSA

Centuries ago tasar culture was exclusively a craft of the hill folks and aboriginals inhabiting the forest tracts of Orissa. Tasar Cultivators, the weaker section of the society, are mostly landless tribes leading their life in the jungle localities. Even now the tasar culture in Orissa is still surviving as a tribal cultivation. Economically weaker tribal rearers are used to rear tasar in forest rearing fields at the cost of a minimum royalty to the Forest Department. Recent statistics indicate that in Orissa tasar culture provides a seasonal employment and a full time engagement to a good number of families for reeling, spinning and weaving. At present this tribal tradition has assumed importance both at the national and the international level as a key industry because of its economic potentialities as well as community development. Tasar culture is certainly increasing the socio-economic condition of the tribal families. In lieu of seasonal employment, the rearers earn a good amount of money with less labour and nominal investment.

## DEVELOPMENTAL PROGRAMME FOR TASAR CULTIVATION

Government of Orissa has taken a number of steps for the development of tasar culture since it is understood well that significant profit can easily be achieved at the cost of a minimum expenditure in natural forest. Some of the important steps taken by the State government for promotion of sericulture in the State are as follows :

### DEVELOPMENT OF BLOCK PLANTATION

Forest area with host plants of tasar worm is an essential base for tasar cultivation. This cultivation and production rate is not up to standard because of deforestation. Therefore, Asan and Arjun block plantation has been undertaken at barren forests and revenue lands by swiss aided Inter State Tasar Project (I S T P).

Tasar culture is sandwiched between tribal welfare and social forestry. Hence special emphasis is being given on social forestry by planting tasar food plants under various projects such as Integrated Tribal Development Programme (ITDP), Integrated Rural Development Programme (IRDP), Drought Prone Area Programme (DPAP), National Rural Employment Programme (NREP) and Rural Labour Employment Guarantee Programme (RLEGP), District Rural Development Agency (DRDA) and Integrated Tribal Development Agency (IDTA).

### DEVELOPMENT OF SEED ORGANISATION

Tasar culture, in fact, depends on the supply of adequate quantities of disease-free layings. The wild seed cocoons of the *A. paphia* generally collected from nature during August-September and are distributed to the rearers for ((Bogai)) crop. Disease-free layings of *A. mylitta* were also produced through seed stations, Pilot Project Centers, I.S.T.P. Grainages and society grainages, for increasing quality basic seed, the Central Government has established Basic Seed Multiplication and Training Centers (BSMTCs.), one each at Baripada, Sundargarh, Lahunipada, Pallahara, Nawrangpur and Research Extension Center at Bangriposi.

### TASAR COCOON MARKETING

For proper marketing of tasar cocoons, the Government has established Tasar Rearers Co-operative Societies. These societies offer

advance and loans at a very normal interest, supply quality seeds of *A. mylitta* and wild cocoons of *A. paphia*. They also purchase tasar cocoon at reasonable market price from the rearers.

### ORGANISATION OF REELING AND SPINNING

Previously yarn productions from cocoons were done by weaver families. Recently the processing of yarn has been introduced into tribal-sector through Reeling and Spinning-cum-Production Centers. These centres impart training on reeling, spinning and ghicha making. These operations encourage the rearers family in a better way to have better out put. The Central Silk Board has also established one reeling Demonstration-cum-Training Center at Fakirpur of Keonjhar district.

### RESEARCH AND DEVELOPMENT SUPPORT

Government of Orissa has established one State Level Research Station at Baripada for research and development. This station has attained the fame of international status. It has been recognised as a research centre in sericulture by International Sericultural Commission, France. This station has also been recognised by Utkal and Berhampur University as a centre of higher learning and research where Ph.D. work can be undertaken. For research and development in *A. paphia* Government of India has very recently established regional tasar research station at Baripada.

### IMPORTANCE OF TASAR CULTURE

Tasar culture provides gainful family employment to forest tribals. Apart from seasonal cultivation, multifarious jobs in processing and trade provides engagement to all categories of people. In Orissa 35,000 tribal families are engaged in tasar culture and 10,000 weaver families are engaged in tasar reeling and weaving.

Tasar cultivation is only practised by the poor and the product is used by the rich. Therefore, it helps flowing money from rich to poor and thus, serves as a means of income levelling.

Tasar cultivation helps to maintain natural ecosystem through afforestation (block plantation) and social forestry. Tasar culture is only done at the middle canopy of the forest and does not harm the bottom and the top canopy of

the forest. Thus, regular cropping keeps up the forest and forest ecosystem healthy.

Soil conservation and soil fertility is restored due to tasar culture. A medium sized tree protects 1,000 metric ton of ground area from erosion and soil fertility is increased by adding organic matters through litters and other exudations from plant and animals.

Tasar food plants purify the atmosphere by taking carbon dioxide and producing oxygen. It also accumulates dust, carbon and smoke particles. Due to photosynthetic process tasar food plants increase the oxygen content of the atmospheric air.

For soap industry, tasar pupae can be used which contain high quantity of oil. Pupae also can

be utilised as the fish and poultry feed. Thus, tasar cultivation provides several useful means for all categories of people.

Broadly speaking tasar culture not only develops the socio-economic conditions of poor tribals, but also elevates the Indian economy. It is the only cultivation through which a lot of money can be earned at the cost of low expenses. Tasar fabric has a tremendous market potentiality in foreign countries. Every year, India is earning a sizable foreign exchange through import of tasar fabrics to America, England, Germany, France and Arab countries etc. So tasar culture should be well preserved and developed further for socio-economic development of our country.

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# Operational Benefits of JRY and EAS in Bodokutuli

(The story of tribal marginal farmers)

Dr. P. K. Chaulia

## PROFILE OF THE VILLAGE :

The village BODOKUTULI having 140 families (SC : 15 families and ST 125 families) is situated by the side of Koraput-Rayagada P.W.D. road. The road passes through the village dividing the streets in one side and the Residential Primary School of the Welfare Department on the other side. The village looks fortified by two big mountains of the Eastern Ranges, on its North and South sides. Hence the land on both sides of the road are mostly on hill-slopes. The villagers cultivate oil seeds like Niger, Pulses like Red grams and cereals like Ragi & paddy at lower slopes. Though the annual rainfall in this area is 1500 MM, yet as the land is sloppy with 50°-60°, all the rain water drains down immediately without allowing the soil to retain any moisture. As a result of this even though the lower slope paddy fields are fertile, yet they used to get hardly one crop a year purely depending upon rainfall.

In this village all the families are either small or marginal farmers. In spite of heavy rainfall and one perennial stream running down the village, yet the small and marginal farmers were not assured of any irrigation nor assured of their crops. Some 30 tribal marginal farmers applied to the local Block Development Officer in 1992-93 for construction of a Diversion Weir/Check Dam over the village stream for channelling the water to their fields. The Block Junior Engineer made a survey of the proposed ayacut and catchment area and prepared an estimate of Rs. 90,000 for construction of Head Works of the Diversion Weir with 150 Metres earthen channel at the first stage, out of funds available in the Block under JAWAHAR ROJGAR YOJANA (JRY). Villagers were told that the Diversion Weir is to be constructed only through the villagers and they are also advised to form a committee of the village leaders who will execute the work. Accordingly the work order was

issued in favour of Village Committee Leader. Under the supervision of Block Junior Engineer the Diversion Weir was completed within 3 months and came to operation stage. It was seen during Kharif of 1993-94 that though there is sufficient water in the stream, as the channel was only 150 metres length it could irrigate only 20-00 Acs. for paddy. It was also seen in subsequent Rabi, that about 10-00 Acs. paddy fields are assured irrigation because the channel was only 150 metre length.

Therefore, it was further surveyed during summer of 1994-95 to find the potentiality for increasing the command of this Minor Irrigation Project. As it can be seen from the enclosed sketch map of Diversion Weir that the channel was further increased to 463 metres including 172 metres of masonry retaining wall on the earthen channel with an estimated cost of Rs. 50,000 under EMPLOYMENT ASSURANCE SCHEME (EAS). This was done departmentally by Block Agency without any engagement of contractor. Hence no extra expenditure.

As a result of increasing the channel and plugging the holes in the channel by masonry retaining walls, the irrigation potentiality increased. It was seen during 1994-95 Kharif that it irrigated 35 Acs. land of 30 tribal marginal farmers and it is programmed to take up Rabi paddy in 30.00 Acs. Thus the project will be able to irrigate total 65.00 Acs. of paddy land during Kharif and Rabi seasons. From sample crop cutting it was seen that the yield per acre is 16 to 18 quintals paddy. The farmers have been cultivating Hy. variety of paddy like JAJATI and PARIJATA the seeds of which are also produced by them by multiplication method from the seed kits supplied to them earlier. They are also using slight dose of Urea fertiliser.

Following are names of the farmers with the Survey No. and extent of area who own their land in the Ayacut of Diversion Weir and have started getting 2 crops in a year. They have been further

advised to take up Redgram, Beans on the field ridges which will further increase the production.

Sl.No.	Name of the Beneficiary	Caste	Survey Khata No.	Survey Plot No.	Area
1.	Miniyaka Pulu, S/o. Sona	ST	38/24	202	0-64
2.	Miniyaka Kash, S/o. Salia	ST	31	204	1-47
3.	Miniyaka Paradesi, S/o. Mali	ST	20	201	0-39
4.	Miniyaka Rath, S/o. Salia	ST	31	198	1-14
5.	Miniyaka Pilu, S/o. Sonosa	ST	20	199	0-70
6.	Miniyaka Majhi, S/o. Rendua	ST	38/46	200	0-79
7.	Miniyaka Maheswar, S/o. Pilku	ST	19	197	1-29
8.	Miniyaka Genua, S/o. Polu	ST	20	194	1-00
9.	Miniyaka Suguru, S/o. Dumri	ST	38/21	49/543	2-00
10.	Miniyaka Tunku, S/o. Dombu	ST	34	195	0-67
11.	Miniyaka Puri, S/o. Kandum	ST	19	42	0-49
12.	Miniyaka Punia, S/o. Polu	ST	38/67	48	1-26
13.	Miniyaka Radia, S/o. Sikunu	ST	38	45	0-71
14.	Miniyaka Rusi, S/o. Dahu	ST	13	50	1-36
15.	Miniyaka Sona, S/o. Sukru	ST	1	54	0-48
16.	Miniyaka Sano, S/o. Dasi	ST	14	52	2-20
17.	Miniyaka Sima, S/o. Sikunu	ST	1	59	2-68
18.	Miniyaka Tipra, S/o. Beturu	ST	62	62	2-20
19.	Miniyaka Sima, S/o. Sukuru	ST	37	61	1-69
20.	Miniyaka Dinu, S/o. Boli	ST	37	73	2-27
21.	Miniyaka Bisi, S/o. Basna	ST	10	64	0-52
22.	Miniyaka Rata, S/o. Selia	ST	37	58	0-87
23.	Miniyaka Hudi, S/o. Shima	ST	1	68	1-06
24.	Miniyaka Radia, S/o. Sikunu	ST	1	72	1-03
25.	Miniyaka Jaya, S/o. Piluku	ST	37	74	0-63
26.	Miniyaka Api, S/o. Tunku	ST	34	75	0-51
27.	Miniyaka Saidi, S/o. Kastura	ST	9	76	0-61
28.	Miniyaka Jugunu, S/o. Kastura	ST	11	79	0-83
29.	Miniyaka Rusi, S/o. Dahu	ST	13	78	1-71
30.	Miniyaka Dama, S/o. Suti	ST	14	79	2-00

**Total :** Ac. 35-20

As it is seen, the project has been constructed with a total estimated cost of Rs. 1,40,000 and it is irrigating 65 Acs. taking both Rabi and Kharif into account and yield per Ac. is 16 to 18 quintals. Hence it is quite cost effective. As the farmers are tribal and marginal and their requirement of food in shape of quantity has been always deficit and they have been depending upon Public Distribution System and now due to the funds

available under JRY and EAS, this small irrigation project could be constructed for them and their total quantity of annual food production has increased and their dependence on Public Distribution System has lessened and ultimately their calorie-intake has increased.

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DRDA, Rayagada.**



# National Movement and Katakavi Laxmikanta

Dr. Santilata Dei (Bal)

**K**atakavi Laxmikanta was a versatile genius who has combined in him the spirit and talent of a poet and novelist, a lyricist and musician, a dramatist and actor, a storyteller and satirist and a journalist and editor. Born and brought up in an aristocratic well-cultured Jamindar family, the Late Katakavi had the opportunity to have higher education. He was a voracious reader of English Literature of Scott, Cowper, Shelley, Byron, Milton, Tennyson and Wordsworth and contemporary Bengalee literature of Bankim Chandra, Hemachandra and Navin Chandra and specially the immortal works of Rabi Tagore. He has admitted about the profound influence and inspiration from the-then Oriya poets and authors such as— Late Fakirmohan Senapati, Radhanath Ray, Nanda Kishore Bal and Gopabandhu Das in his literary career. He was well-versed in Vaisnava-Literature and the impact of Oriya Yatra, Lila, Suanga of those days had greatly moulded his literary creation. But Laxmikanta has shown the originality of thought, style and language befitting to the sense, occasion and fact as a nationalist and mystic poet, parody writer as well as the author of numerous children's literature. Though diseased, deformed and disabled, he has contributed freely and richly to the Oriya-Literature in the forms of small poems, ballads, devotional songs (Jananas, Kirttanas and Bhajans), dramas and melo-dramas, anthology of poems for the children and maidens (Kumaris), stories, essays, farces, satires, parodies and novels.<sup>1</sup>

The then political situation of the country, the struggle for freedom, creation of separate

province of Orissa had inspired the poet to compose a number of national songs specially the active part taken by his family-members in the freedom movement gave further impetus to the poet to compose a number of patriotic and national songs which are set with different tunes. These songs<sup>2</sup> infused national consciousness, revolutionary spirit and new vigour in the minds of the freedom-fighters for the liberation of the motherland. He has given call to the people, both men and women to give up indolence, lethargy and to come forward to fight against the British-rule.<sup>3</sup> His famous national song in the adoration of mother Utkal (Utkal-Janani) '*Bande Utkal Janani*.....' was sung in one of the sessions of the Utkala-Sammilani as the opening song. Similarly strong national feeling, full of fiery words in a rhythmic style is reflected in most of his patriotic songs<sup>4</sup> out of which one such was recited in the District conference held at Bhadrak under the presidentship of Pandit Utkalmani—'*Udai nisana bajai bheri/Jagai bipula nutana kampa*'<sup>5</sup>. His intense nationalistic fervour is evinced in his poem—'*Udbela muhin sindhu lahari, Pralaya murti manta*'<sup>6</sup>. It will not be an exaggeration to mention here that Katakavi was the first Oriya poet to compose the marching songs '*Garji uthuchi turyanada uduchi vijay jaitra*.' Idea of secularism, strong feeling of national integration and communal harmony are expressed in his poem when he has called upon the Muslims, Christians, Jainas, Buddhists and Hindus to be united for the sake of the motherland.<sup>7</sup>

His strong feeling of patriotism has found place in his children's literature in which the

poet has reminded the posterity of Orissa's past glory and heroic deeds and chivalry of their great sons.<sup>8</sup> In his *Balacharaboli* (inspiring poems for young scouts), the poet has composed an anthology of poems full of patriotism, unity, alertness, and sacrifice. The syntax of words and rhythmical metres are noteworthy in his poems 'Age Chal and Boli'.<sup>9</sup> It will not be out of place to mention here about the deep sense of devotion and unstinted confidence of the poet on Gandhi's undisputed leadership, impressive personality and principle of non-violence for the emancipation of the country.<sup>10</sup> The poet has also awakened the peasantmass from their slumber and inactiveness and has aroused them to be self-sufficient in the production of food and clothing.<sup>11</sup> Like a true disciple of Bapu, he has addressed the common mass to discard foreign cloth and foreign articles and to spin with the spinning wheel. The utopia of green-revolution (Sabuja-biplaba) has been reflected in a number of poems which depicted the affluence, flora and fauna of the glorious past.

Owing to the strong national feeling, devotion to the motherland, yearning for liberation, recollection of the glorious heritage of the poems along with the lucid style, spontaneous expression of thought and rhythmical note of words set with appropriate tunes, he may be rightly assessed as a national poet (Jatiya-Kavi).

But the national consciousness and patriotic feeling of the poet are not confined to the poems only. They are reflected in his children's literature, satires, parodies and particularly in his single incomplete novel *Kanamamu* (One-eyed maternal uncle. *Kanamamu* is a unique creation of Laxmikanta. The hero, Kanamamu is a social worker and reformer, a selfless bold freedom fighter and on the whole a dedicated soul whom the author has cherished to depict as a leader of the Quit India Movement of 1942.<sup>12</sup> Kanamamu, the universal maternal uncle of the villagers from many dangers has organised the youngmass into a militant force under him and with their help he has saved the villagers from many dangers. Through this adventurous

character, the author has tried to expose maladministration of the British-rule, particularly the corruption and oppressive measures of the Police Department. Kanamamu was courageous enough to challenge the British *Darogas* and *Munsis* by assaulting the *Munsis* physically when the hitch reached climax. Hajimian, one of the characters of the novel is a symbol of religious tolerance, national harmony and social solidarity.

Kantakavi has criticised the social evils and anomalies of the British Government, some powerful self-seeking zamindars and some hypocrites of the non-co-operation movement through satire, sarcasm and humour. He had exposed the evil intention, *mala fide* motive, hypocrisy and secret alliance of some of the opportunists with the British Government in his satirical writing entitled '*Asahayojira Atmakatha*, (An autobiography of a non-co-operator). He even did not hesitate to make blunt criticism of some of his near relatives who had been the blind supporters and flatterers of the British Government, '*Dimbakracy*', '*Nava Ramayana*' 1942 *Chalisa*, *Panchamruta* and *Chhanchuni-banam Koroda* are his political satires.

Kantakavi Laxmikanta may be rightly called the founder of Oriya parody. Even in the last quarter of the 20th century the late Kantakavi has still occupied an unrivalled position as the parody-writer in Oriya-literature. He has criticised the-then British Government and pointed out the weakness of the leaders of the freedom movement and has warned the ultramodern attitude of the English-educated young men and women. *Chataka Chandrahasa champu* is the glaring example of his outstanding success in parody-writing.<sup>13</sup>

His reformative attitude, struggle against untouchability and upliftment of the downtrodden, specially the rightful position, security and modesty of the women in the society are vividly reflected in his drama '*Laxmi-Chandaluni*'. On the background of a mythological theme, Kantakavi has highlighted women-liberation, and sufferings of the women

by the males in the form of a dialogue between Laxmi and Jagannath.<sup>14</sup> We come across the national awakening and consciousness of the poet in the recollection of glorious past and rich cultural heritage in a number of biographical writings such as *Saisava-Smruti*, *Nidaghe Salandi*, *Sravane Salandi* etc.

On account of his physical disability though Kantakavi could not take active part in the national movement and politics, he justified the wise saying-'Pen is mightier than sword'. He was simultaneously an editor, a journalist and a news-writer. He was contributing articles to *Observer*, *New Orissa* and *Current Affairs* on the progressive activities of the freedom fighters of Orissa and was sending news to A. B. Patrika in connection with the political happenings and national movement of the state. But his outstanding creation was the foundation of satirical journal '*Dagaro*'. The very motive and sense of the title of the journal '*Dagaro*' (the messenger) was justified which played the role of a *Dagaro* or messenger carrying the political and social news, replete with satire, criticism and humour to the people. Its wide circulation and popularity completely depended on the powerful editorials written by Kantakavi himself and the acute political satires relating to the participation of India in the Second World War, imperialist attitude of Hitler and Mussolini, role of Gandhi and Neheru in the politics, misrule of the British Government. Among various sections (bibhagas) of the journal, *Bilua Bichara*, *Nagabaccha* sections were most interesting and attractive for the readers. *Bilua bichara* contains bold and objective criticism of the eminent personalities and leaders of the country as well.<sup>15</sup> Sometimes the author used to write under a number of pen-names, one of such was '*Kapibara-Hanumanta Nakal nabis*'.

The *Nagabaccha*-section was meant for the boys and girls below eighteen years in which befitting articles were published with the object of

building their character, arouse their national spirit, enhance their knowledge in different branches of studies. A pen-friend sub-section was also attached to this section in order to develop friendship, good understanding and mutual acquaintance among the adolescent boys and girls through correspondence.

Thus the powerful satirical writings of Kantakavi in various forms, such as poems, dramas, parodies, short-stories, journalism had given much impetus to the national movement besides enriching the Oriya Literature to a great extent.

#### FOOT NOTES :

1. *Kanta-Sahitya Mala*-Part-II-P.2
2. 1, 2, 3, 4, *Jatiya Sangita*, *Ibid*, Pages 1175-1184.
3. Ray, S. S., *Kantakavi Srsti-Samiksa*, P. 21
4. *Kanta Sahityamala*, Part-II, P. 1175
5. *Ibid*, P. 1178
6. *Ibid*, P. 1183
7. *Ibid*, P. 181
8. Gohira tikiri, Simuli pala, Balachara boli
9. Jhum jhumka  
Baa bahe dumka  
Megha dum dum  
Batasara dhum  
Boli, Balachara boli, *Kanta Sahityamala*, Part-II, P. 826.
10. Gandhi, Yugavatara etc.
11. Danara yogada karare bhai,  
Kanara yogada kar  
*Ibid*, P. 1179.
12. Preface, Kanamamun, *Kanta Sahityamala* Part-II P. 1060.
13. *Ibid*, Part-II, P. 454
14. *Dagaro*, IV Yr., 11th Issue, 14th, 4th issue

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# Entry of Foreign Print Media and Our National Interest

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Globalisation of India's economy has brought in its fold the opportunity for the foreign print media to step into our country. No doubt its impact on our various activities including our life style is bound to be influenced with the extensive exposure of what is happening in different political systems and cultures of the world.

We are all aware of the fact that communication plays a vital role in the process of transformation of a society in the changing situation. The print media is one such communication system even though confined to the reading public only. In India about 30% of our population are capable of reading newspapers in different languages. But the other communication medias like the T.V. and Radio have already reached the common people in remotest corners of the country. These electronic medias can influence the viewers and listeners of any age, and language with or without education. Hence the print media has nothing much to influence the opinion of the masses as such, excepting confining itself to a small segment of the intellectuals who have the capability to evaluate every situation and problem in the context of our national interest. Even then the real threat comes from the western media moguls and their financial deals in a developing country like ours.

The Indian print media publishing houses are now perhaps aware of the fact that investigative journalism is much sharper in the west. Their counterparts in the west are in a better position to invest huge amount of money to buy quality and quantity in matters of good newsprints, printing technology, speedy information services/quick photography processing with technicolour. In such a situation the Indian collaborators are naturally tempted to opt for a joint venture to allow the foreign print media to step in.

The apprehension in the minds of the intellectuals in India is that the technology is galloping over the old regulatory machinery. Hence how long India can resist the temptation of not availing such opportunities? There is a saying that "you chase colonialism out of the door and it comes back through the sky". Our thirst for knowledge is also increasing. The science and technology have provided the scope for development to ensure a qualitative living. Now we are encountered with a situation whether we should allow the outside culture to over-take us or to preserve our age old cultural heritage and social values. An indepth study will no doubt confirm that our civilising values have already gone to the oblivion.

On the other hand, there is no denying the fact that the foreign electronic media net-works had already brought in their wake, senseless violence, vulgarity and a number of their programmes were obscene and had a degrading effect on public taste specially among the elders. To attract maximum viewership the foreign TV channels have loaded their programmes with pornography, crime and violence. Apart from this, the consumerism by these "intruders" through the sky is having a harmful effect, particularly on the viewers of the younger generation. Our natural resources and raw materials will flow to the advanced countries and we will get the consumer products from them.

A viable solution could emerge only after discussions with transnational satellite TV operators and a full national debate on such issues and criticism, besides laying down appropriate guidelines and a self-regulatory but effective mechanism devised to ensure their observance.

As regards the foreign print media, its potentiality to spread disinformation at the behest

of the vested interest in India and abroad for calculated incitement of communal passions can never be undermined. What could be our safeguard against such possibilities? Moreover the perception of the Indian press is based on safe-guarding the integrity of the nation and sovereignty of the country, besides maintaining the secular fabric of the society and communal harmony, which may not be adhered to by the foreign press.

The question before us is to know why the foreign agencies want to spread their media empires in India? What could be their motives? Whether they are planning to destroy our cultural heritage, social values and spread consumerism to influence us to buy mainly foreign products? Whether they will divert our attention towards permissiveness and make us sex hungry? Whether they will help perpetuate kickback system as is prevalent in the west? If all such questions are not answered keeping in view our national interest, the entry of foreign print media must not be allowed.

The time has now come for the Indian newspaper publishing houses to improve upon

their production, to compete with the foreign newspapers obviously to safeguard our national interest. To do so, the publishers may have to think in terms of suitable payment to their reporters and journalists to encourage investigative journalism, rural reporting, coverage of socio-cultural activities, exposure to privacy of people in high offices, public sector officials and others in public life which are detrimental to the society without fear as well as to highlight the heroic performance and achievements of individuals, etc. There should be a constant endeavour on the part of the Indian press to inculcate the spirit of developing the Indian character with civilising virtues. We may develop all kinds of science and technology, arts and films but only character can save our country from the current situation in which corruption rules the society. At this juncture the foreign print media would always encash this opportunity and gradually bring in economic slavery to our people. Now it is up to all of us and specially up to the intellectuals to think seriously about it and act wisely before it is too late.

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## Pathani Samanta — The Tycho Brahe of India



Chandrasekhar Simhasamanta Harichandan Mohapatra, most popularly known as Pathani Samanta was a prodigious astrophysicist of Orissa. Born in Khandapara, a Tributary State of Orissa in 1835. Chandrasekhar carved out a new graph of his life by turning to the skies, stars and luminaries right from his teen age. His nephew was the ruling chief who despised the queer avocation of Chandrasekhar. But Chandrasekhar showed no zeal for pelf and power, yet chose to remain indifferent and found immense interest in measuring shadows, altitudes, expansions and gazing at the stars winkless out of irresistible curiosity. His knowledge of Sanskrit and classics blended with a passion for star-gazing made him a renaissance rebel and his psyche was fully prepared to commune with the blooming nocturnal sky. He studied the Hindu astronomy, i.e., the *Samhitas* and *Siddhantas* of Aryabhatta, Ganesa, Varahamihira, Satananda, Brahmagupta, Bhaskara, Kamabhatta and others and found that the computed figures therein about the zodiac and

the *Panchanga* were not in consonance with what he observed for himself by spending sleepless nights and gazing at the sky. This was the beginning of his research. He questioned the texts and decided to augment a laboratory and an observatory of his own. With the help of crude, unsophisticated implements he succeeded in locating the areas of errors that had crept into the laudable texts authored, by previous scholar-astronomers. For an example, while determining the *tithi*, *yoga*, *karan* and exact placement of moon he found the discrepancy was about more than five and half hours. Years of endeavour helped him find out the reason of such discrepancy which was due to the strange motion of the moon. He brought down the difference to 48 seconds in case of the *tithi* and 1 minute 12 seconds in case of the determination of the stars. Still, this solution did not satisfy him. He carried on intensive research and finally came out with success. He had devised various globes, patent telescopes, astrolabes and contrivances to make his observations free from even the slightest error. Those instruments were in a way an improvement upon the old ones as devised by early masters and some were quite new, i.e. Bahukaksha Yantra, Golardha Yantra, Mana Yantra, Chakra Yantra, Kapala Yantra and Swayamvaha Yantra etc. The materials which he used in manufacturing these Yantras were bamboo posts, bottle gourd, wooden planks, iron nails, steel arcs, mercury, glassware, wooden posts & pipes etc. By using his Mana Yantra he could reckon the height of the Mahendra hill and the Saptasajya hill with an ease.

It was Sri Jogesh Chandra Ray, Professor of Physical Science, Cuttack College (now renamed as Ravenshaw College) who brought Samanta Chandra Sekhar to limelight. When he showed his telescope (having a refractor of  $3\frac{1}{4}$ " diametre) Chandrasekhar expressed his thrill. He immediately recognised that the instrument was magnified about hundred diametre (it was infact adjusted with a power of 80) and regretted that he had not had the advantage of such instruments in his younger days.

It is unfortunate that Chandrasekhar was not aware of Jai Singh's observatory and his patent Yantras of the 18th Century. Jai Singh's 'Samrat Yantra' (90X147), 'Shashtamsa Yantra' (sextant instrument), 'Rasivalaya Yantra' (ecliptic instrument), 'Kapala Yantra' (hemispherical instrument), 'Digamsa Yantra' (azimuth instrument) etc. would have supplemented to a great extent to Chandrasekhar's findings.

However, Chandrasekhar by dint of his assiduous study could rectify anomalies pertaining to precession of equinoxes (*ayanamsa* as 57.615 seconds per annum), difference between the parallaxes of the sun and the moon (56'6"), moon's inclination as 5'9" (in modern astronomy it is 58'48") and Mars' 1.51'. His major contribution to world astronomy is his findings about the irregularities of the moon which he pointed out as *Tungantara* (evection), *Pakshika* (Variation) and *Digamsa* (annual equation) which are 2.4', 38'12' and 12' respectively. The Greek astronomer Hipparchus detected moon's evection in 150 B. C. and the 16th Century Danish astronomer Tycho Brahe had observed both evection and annual equation of the moon but not the variation. Chandrasekhar's calculations of forthcoming lunar eclipses on 22-4-1901, 17-10-1902, 11-4-1903 & the solar eclipse on 31-10-1902 were conveyed to Edward

VII through Prof. Ray on 18th December, 1901. He had his own theories regarding the determination of the meridian (not Ujjain), the obliquity of the ecliptic etc. While reiterating the apparent motionlessness of the Earth Chandrasekhar tried to explain the dynamics of the motion of a two-body system which is similar to modern classical mechanics. The 'centre of mass' of the Sun-Earth system actually lies close to Sun's centre whereas of the Sun-Jupiter system the 'centre of mass' or the *bharakendra* is quite outside the Sun which partly accounts for Chandrasekhar's theory. But the real problem was Chandrasekhar's 'Mana Yantra' was not highly sensitive to detect parallaxes of stars (i.e. apparent motion of the distant stars). Anyway mathematically, determination of the Earth-Sun motion would be the same if the Sun is taken to be moving round the fixed Earth.

His *magnum opus* the *Siddhanta Darpana* was completed in 1892. It contains 5 principal sections (*adhikara*) and 24 chapters (*prakasha*) in 2500 Sanskrit verses (inclusive of 216 verses as quotations from early texts; i.e. *Surya Siddhanta* and *Siddhanta Siromani*). It took the author long 23 years (the date of commencement being April 14, 1869—three years after the Great Famine in Orissa). The then Maharaja of Ahthamallik kindly provided financial assistance for printing of the book in Devanagari script at the Girish Vidyaratna Press, Calcutta under the direct supervision of Prof. Jogesh Chandra Ray who wrote an elaborate introduction in English running over 66 pages and a two-page note in Sanskrit. The book came out from the press in 1897 and it reached the scholars two years after in 1899.

The book soon created a stir among scholars of international fame. The British Government was actively considering to confer the distinguished title of *Mahamahopadhyaya* on Chandrasekhara. In this regard, Shri K. P. Gupta, Collector, Puri first recommended to the higher authorities which was further pursued by Mr. Superintendent Cooke. The Government released a *Sanad* on 3rd June 1893 signed by the Viceroy & Governor General of India (Mr. Lansdowne) in Simla where it could have been conferred upon Samanta Chandrasekhar. Since he could not make it convenient to go to Simla, the official conferment was deferred to 20th March 1894 & the venue was fixed at the Conference Hall of Belvedere Palace, Calcutta. Chandrasekhar also failed to go to Calcutta and subsequently a special *darbar* was fixed at the Barabati Fort, Cuttack where Commissioner Cook would administer the highest honour on Chandrasekhar on 29th August 1894. Fate was playing truant. This time too, Chandrasekhar could not attend the *darbar*. He was finally felicitated at the Barabati Fort Cuttack on 3rd September 1894 which was witnessed by important celebrities of Orissa including poet Radhanath Ray.

His monumental work the '*Siddhanta Darpana*' drew acclaim from the international Press. "The Knowledge", a magazine of Science, Literature and Art published from London spoke highly of the book in its volume No. XXII at page 257. The following extract speaks for itself:

"Of all the numerous work on astronomy that have been published within the last few years, this (*Siddhanta Darpana*) is by far the most extraordinary, and in some respects the most instructive. It is written by a Hindu of good family of Khandapara in Orissa, and is a complete system of astronomy founded upon naked eye observations only, and these made for the most part with instruments devised and constructed by the writer himself. Those who read the sixty pages of the introduction in English, which the fellow-countryman of the author, Professor Yogesh Chandra Ray of Cuttack College, has written, will certainly regret that the barrier of an unknown tongue debars them from a more intimate acquaintance with the very striking personality that Professor Ray describes. The work to which Chandrasekhara has devoted himself, and which he has carried out with very conspicuous success is this: the native Hindu almanacs computed from the *Siddhantas* were falling into serious errors, and no two current almanacs agreed in their computations. Chandrasekhara, therefore, has redetermined the elements of the old *Siddhantas* but has rigorously confined himself to the ancient methods, his principal instrument of observation being a tangent-staff, devised by himself, of a thin rod of wood twenty-four digits long, with a cross-piece at right angles to it. With this rude means he has obtained an astonishing degree of accuracy: his values for the inclinations of the orbits of the nearest planets are correct to the nearest minute in almost every instance. The ephemerides computed from his elements are seldom more than a few minutes of arc in error, whilst the Bengalee almanac may be in error as much as four degrees. To Hindus, for whom their religious observances are regulated by astronomical configurations, this work by one of themselves, a strict follower of the severest laws of their religion, and conducted throughout solely by traditional Hindu methods, is of the highest importance, as it removes the confusions which had crept into their system, without in the least drawing upon the sources of Western science. "But the work is of importance and interest to us Westerns also. It demonstrates the degree of accuracy which was possible in astronomical observation before the invention of the telescope, and it enables us to watch, as it were, one of the astronomers of hoary, forgotten antiquity actually at his work before us today".

Pundit Chandra Sekhar Sinha Hari Chandan Mahapatra  
Samanta of the Tributary State of Khondapara in Orissa

I hereby confer upon you the title  
of Mahamahopadhyaya as a personal  
distinction.

*(By Lord Curzon)*  
Viceroy and Governor General  
of India.

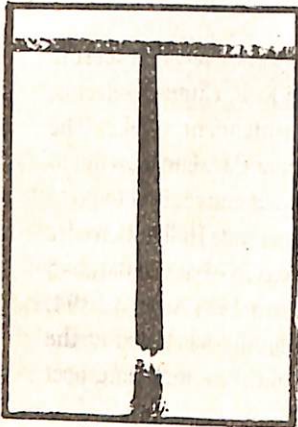
Simla,  
The 3<sup>rd</sup> June 1893.

वीरघ्याय नमः ।  
परिचयम् ।  
सिद्धान्तदर्पणः ।  
सध्यसाधिकारः ।

प्रथमः प्रकाशः ।  
वर्ष - १८९३ ।

वीरघ्यायचक्रवर्तनमिन्द्राभिरभ्युदयं  
वीरघ्यप्रमुखादिनामरमिकावुष्टादिपीठोपलम् ।  
वीरघ्यायचक्रवर्तनमिन्द्राभिरभ्युदयं प्रथमः  
वीरघ्यायचक्रवर्तनमिन्द्राभिरभ्युदयं १ २ ३  
सध्यसाधिकारपरचक्रवर्तनमिन्द्राभिरभ्युदयं  
विप्रव्रातसिगोक्त्यावर्तनमिन्द्राभिरभ्युदयं ।  
वर्षः कापि दिवाकरांगमदिनेर्ष्यान्करोत्वापिते-  
रेवात्तत् सद्यसाधिकारं सुचिते बोधाय वासावलेः १ २ ३

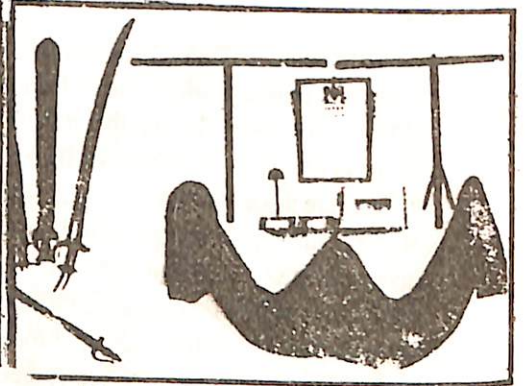
Extracts invocatory verses  
published in his Siddhanta  
Darpana



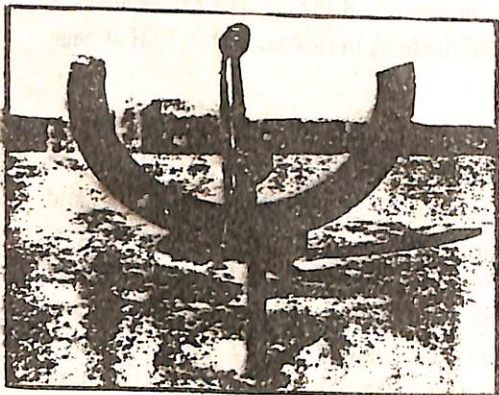
Mana Yantra



The stylus, specs and  
telescopic implements used  
by Chandrasekhar



Mana Yantra and family swords



A Yantra devised by  
Chandrasekhar



Another Yantra devised  
by Chandrasekhar for his  
observation

Handwritten text in Odia script, including a date '9/6/95' and a signature.

A Specimen Handscript of Chandrasekhar



ORISSA REVIEW

Another weekly journal of Science, "The Nature," published from London paid a tribute in its Vol. 59 (page-436) : "Anyone who reads the very interesting introduction of sixty-one pages that Professor Ray has attached to this Sanskrit work (*Siddhanta Darpana*) will regret very much his inability to fathom the work that follows. For therein is contained the results of the patient and industrious inquiry of one who, unaided by the accumulated knowledge of Western astronomers, resolutely set himself to solve the problem of celestial mechanics by the aid of such instruments as he could fashion himself, and where the time-honoured clepsydra supplied the place of the sidereal clock. The only assistance seems to have had were similar rough observations of Bhaskara (born 1114) and some still older observers. Professor Ray compares the author very properly to Tycho. But we should imagine him to be greater than Tycho, for without the same assistance, without the encouragement of kings and the applause of his fellows, he has advanced his favourite science quite as effectually as did the Danish astronomer. It is especially curious to notice that the system at which Chandra Sekhar ultimately arrived, and the explanation he offers of it, bears a very considerable resemblance to that which Tycho taught. The author has never been able to convince himself that the earth turns on its axis, or that it goes round the sun; but to the planets he assigned heliocentric motion, much as Tycho did. We get some notion of the success that attended the work, and of how much it is one man's power to accomplish, if we examine the differences between the values he assigns to some of the constants of astronomy and those in use with ourselves. The error, in sidereal period, of the Sun is 206 seconds; of the Moon, 1 second; Mercury, 79 seconds; Venus, about 2 minutes; Mars, 9 minutes; Jupiter, an hour; and Saturn, rather more than half a day. The accuracy with which he determined the inclination of the planets to the ecliptic is still more remarkable. Mercury offers the largest error, and that is only about two minutes. In the case of the solar orbit, the greatest equation to the centre is only 14 seconds in error. In the Lunar theory, the revolution of the node has been concluded with an error of about  $5 \frac{1}{2}$  days, less than the thousandth part of the whole period; while he has independently detected and assigned very approximate values to the evection, the variation, and the annual equation. The main object that Chandra Sekhara had before him seems to have been to correct the calendar, and regulate the daily ritual of the Hindu religion. No two almanacs, Professor Ray tells us, agree; but any attempt to introduce the nautical almanac and its acknowledged accuracy would prove unsuccessful. The necessary corrections and unification must, to be acceptable, come from within and be the work of a Hindu, uninfluenced by foreign education. The work of Chandra Sekhara has received the sanction of the honoured *Rishis*, and the adoption of the corrections which he has shewn to be necessary will exert upon native society a beneficial influence, whose importance can be hardly overrated in a community where a correct almanac is an indispensable equipment of every household. We should like much to linger over Professor Ray's remarks on the subject of precession and his chronological deductions. These and many other points are discussed with great ability, though Professor Ray modestly disclaims any special astronomical capacity. The effect is to leave us at every page with a higher opinion of the author laboriously recording his observations on a palm-leaf, and unselfishly devoting his life to the services of his countrymen, who do not appreciate the nobility of the effort and the entirety of his devotion. We are in full sympathy with the editor when he writes thus of the author regarding his privations and his star-gazing: 'What has he done after all' ? asks the impatient critic. To him I would say is it not enough to find in this man a true lover of science, who, regardless of other people's unfavourable opinion of his work, their taunts and dissuasions, has devoted his whole life to the one pursuit of knowledge; who has shewn the way to original research amidst difficulties serious enough to dishearten men in better circumstances; who has employed his time usefully, instead of frittering it away like the usual run of men of his rank, on a work which guides the daily routine of millions of his countrymen" ?

The future Newton or Einstein of India was probably destined to wade through life's multiple trammels. Had he been affluent and blessed with a healthy life he would have made lasting contributions in the field of spherical geometry, astronomy and space science. Thanks to Shri Mahendra Dav, the Raja of Athamallik for his munificent help, otherwise the *Siddhanta Darpana* would not have seen the light of the day. Late Gourrishanker Ray made many a futile attempt in drawing the attention of the rich in 'Utkal Dipika' in 1887 for raising funds for the printing of the *Siddhanta Darpana*. Long before the book was published the Oriya almanac, the 'Utkal Panjika' was being published by Cuttack Printing Company under the direct supervision of Samanta Chandra Sekhara and his Pupil Harihara Khadiratna of Khurda and after latter's death, by his son Sadasiva Khadiratna. When Sadasiva could not assist properly on account of his poor eyesight Chandra Sekhara banked upon Rajaballabha Mishra, assistant teacher of Khandapara School who was also Chandrasekhara's student. But the Goddess of Fortune was always hostile to Chandrasekhara. Sadashiva Khadiratna and Rajaballabha withdrew their loyalty from their teacher and in 1896 three dissimilar almanacs were found to have been published in Orissa which created immense confusion. These three were published by the Cuttack Trading Company, Arunodaya Press(Cuttack) and Sitanath Ray Press(Balasure).

Chandrasekhara experienced acute financial crisis during his old age. The Superintendent of the Tributary Mahals of Orissa wrote a letter to Bengal Government on 13th July 1903 for the grant of pension to the author of *Siddhanta Darpana*. Lord Curzon, T. Raleigh, E. FG. Law, E. R. Elles, A. T. Arundel and Denzil Ibbetson sent a joint-petition to His Majesty's Secretary of State for India, Lord George Francis Hamilton, G. C. S. I. on 17th September, 1903 for the grant of a literary pension to Mahamahopadhyaya Chandra Sekhara Sinha Hari Chandana Mahapatra Samanta and stated therein :

XXX "The Pandit is an old man of 68 years of age, in poor circumstances and extremely feeble health, whose whole life has been consistently devoted to the study of science. The Bengal Government consider that the circumstances are exceptional, the case being a curious and interesting one of devotion to learning for its own sake, and the Lieutenant Governor believes that the Government in honouring such a student would honour itself. The Government is also of opinion that, in view of the high social position of the Mahamahopadhyaya, the grant to him of a pension of Rs. 50 - per mensem would be suitable.

We consider that the grant of a pension to such a student would be entirely in consonance with native feeling, and would find a precedent in the policy under which we support many indigenous Sanskrit Schools where instruction is given in subjects hardly more profitable than the pursuit of astronomical methods without the aid of modern instruments. Moreover, we regard the Pandit's work as by no means devoid of interest, and even value, since it throws light upon the beginnings of Astronomy by showing what can be done by primitive instruments. XXX "Chandrasekhara continued to receive the pension till his death.

Samanta Chandrasekhara was a staunch devotee of Lord Jagannath. The *Siddhanta Darpana* opens with an invocatory to the darkblue seraphic effulgence of the divine Septemvir (i.e., Laksmi, Bhu Devi, Madhava, Sudarshana Chakra, Sri Jagannatha, Balabhadra and Subhadra) crowning the *Ratna Simhasana* in the sanctum sanctorum at Nilachala (Puri). Each Chapter of his book contains an eulogy to Lord Jagannath which precedes the colophone. The 23rd chapter (*Prakasha*) is exclusively devoted to Lord Jagannath that runs over 56 verses. Chandrasekhar had intently desired to breathe his last in Srikshetra (Puri) and accordingly spelt out his death-wish in time to his family at Khandapara :

"*Sthanam natham tirthadhipate Batayoh Sri Jagannathah dusthah* XXXX *Gatram mama supavitre nipatatu purusottamaksetre*" (O Jagannatha)! This poor beseeches Thee to grant him a place (for breathing his last) somewhere between the Kalpa Bata and the Sea. XXX Let my physical body rest in the holy land of Purusottama Ksetra).

On the scheduled day, Samanta Chandrasekhara was given a doleful ceremonial send-off at Khandapara and the old, decrepit devout astronomer set out for Puri where he died in 1904.

Acknowledgement :

1. The State Archives
2. The State Museum.

Rajkishore Mishra





*Hon'ble Vice-President of India Shri K. R. Narayanan inspecting the Guard of Honour at Bhubaneswar Air Port on 2-1-1995 at 11.15 A.M.*



*H. E. Governor of Orissa Shri B. Satyanarayan Reddy goes round the Flower Exhibition organised by Flower Lovers' Association at Soochana Bhawan on 8-1-1995.*