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Sovarani Memorial College
Jagatballavpur, Howrah

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Chief Editor

Subhajit Pandit

FOREWORD

I am pleased to learn that the 13th edition of the Teachers' Journal named "INSIGHT" is going to be published shortly. In this context, I do convey thanks to all the members of the Editorial Board for timely publication of this journal. At the same time, I would like to encourage the teachers who have not yet penned any article for publication in it, to try to enrich the journal by submitting the same in the years to come. It may be mentioned that this edition is being published on the very day of the closing of the Golden Jubilee year of the college.

Dr. Kalyan Kumar Mondal
Principal

FROM THE EDITOR'S DESK

*On the 51st anniversar yo four esteemed institution,
I present to you the 13th volume of INSIGHT:
SOVARANI MEMORIAL COLLEGE JOURNAL.
I would like to take this opportunity to extend my
congratulations to the authors for their timely submission
and gratitude to the editorial board for working tirelessly
during these tough times.*

Subhajit Pandit
Chief Editor

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Women empowerment and the role of media in it's acceleration in India

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Educational institutions,Governments, non - governmental organizations are responsible for the prevention of all forms of discrimination against women in India such as – ideas of human rights, the concept and status of women's right, violence against women, eve teasing and terrorizing women health and reproductive areas. The most significant and longest social movement continuing is movement for emancipation of women. Though the primary goal for women empowerment is to improve the quality of life of women but it has also deep ramifications in social, economic and political scenario of body polity.

Although it sounds intriguing how from a highly dignified position in India's mythic history, the woman in India has been relegated to a secondary position. It would be a sad commentary on the subordinate role of women in India when women is ideally viewed as Śakti (Power), the origin of power itself but in reality found as helpless, halpess woman without any identity except that of a wife, or the mother who has very little voice in decision making and has very little by way of her own basic choice. Although discrimination against and exploitation of women are global phenomena, their consequences are more tragic in some parts of the globe particularly in under developed countries where, ignorance, deprivation of the basic necessities of life, and the ever-growing pressure of transition from tradition to modernity all combine to aggravate the inequalities that women suffer to a point at which their existence is reduced to a continuous battle for survival. Improving the status of women is regarded as the key to narrowing the gender gap and achieving a better quality of life.

Moreover, to discuss women empowerment it is necessary to deal with the present situation of women in India. In this paper I would like to briefly discuss certain key aspects related to the women which media should adequately cover and facilitate the process of empowerment of women.

I

Areas of discrimination against women detected.
Discrimination against women is a common phenomenon that places women in a subordinate position depriving them from all types of

necessities of life and making their life vulnerable and feel insecure. However, the areas of discrimination need to be identified in order to make them free from all the impediments they face. The major areas of discrimination revealed and examined can be explained in the following way.

Ideas of human rights

There are certain basic needs that human beings should get to survive or live in dignity. Basic shelter, education, food, health - care are claimed to be the fundamental rights and deprivation from these are the denial of human rights. There are other economic, social, political and cultural rights internationally recognized and agreed by the world's majority of governments to fulfilling these rights though not followed by many in practice by denying their validity. The rights for human in international are as lies on the principle of a common humanity –"All human beings are born free and equal in dignity and rights".

Empowerment of women in India is a necessary condition for demanding rights for which again women and girls need to be educated and enlightened. This would finally be apple to end poverty which is restricted not only to income and financial levels but also to eradicate the poverty of thought and powerlessness. The weaker people generally approach the powerful to end the helpless experience they face by their assertion for rights and therefore the main reason to examine poverty is the claim for human rights. Getting rid of poverty should not only be aimed to the end of unequal distribution of wealth but should be served from the perspective of freedom, justice and dignity especially to the establishment of rights for women.

The status and concept of women's right

The concept of women's right is not an addition to human rights but rather a concurrent issue that needs to be acknowledged and clarified. Women's right is a fundamental one that needs to be attended and concentrated upon to review the present patriarchal form and amend the discriminatory laws. The concept of 'status' needs precise definition and hence can be explained in terms of its position and power within the family and community by measuring women's access to knowledge, economic resources and political power. This can also be justified in terms of the independence they have in offering choices and decision making in both of their personal and other lives. The status of women in any state or society reflects the stage of its present form at which it has arrived. It therefore, includes not only women's personal and propriety rights but also

their duties and liabilities.

Certain features in India are identified for their socio-economic inequality and dependence among which lack of education, early marriage, non-existence of employment opportunities are the foremost factors. Illiteracy and limited education affect the girl mostly, who then in their adulthood fail to compete with men in the skilled labour market and are, therefore, forced into low-pay, low-skilled jobs – and also to prostitution. The health section related to women's right focuses, on the issue of coercive practices put upon women like involuntary multiple pregnancies, forced abortions to have a baby boy, wife battering and divorce for women, etc. which is a serious denial of their rights. This mostly happen because of the lack of female education since education affirmed as a human right is not implemented equally for girls. This is significant in the context of women's health because education is claimed over decades as an effective method of Wempowering women to gain control over their fertility.

Violence against women

Violence against women happens universally and one common case where women feel insecure both at home and at work is sexual violence. Gender violence is basically an abuse of power. The simple way to establish power for men is doing physical violence and it happens to unemployed women who have lack of access to education, health services or resources to find out alternative accommodation. Women wanting to have an independent income and gain freedom sometimes face serious threat and violence from the male members of their family and community. These happen especially in underdeveloped countries like Bangladesh because of the patriarchal societies where men hold the power to stop women finding their efforts to improve their situation and becoming autonomous. Women face violence when male opposes their attitudes of asserting freedom because women resent the situation when they are no longer financially dependent upon them. Male members exert their authority and power by torturing women physically and doing violence upon them sometimes lead to serious health damage including death.

Education is a way out for women to become independent but gender violence again puts restriction upon girl's access to education. The harsh reality of violence upon girls impedes them from taking privilege from educational opportunities thereby reducing their chances of lifting themselves up from the existing brutal situation. Girls in primary and secondary education levels reporting sexual violence at the hand of their male classmates and their teachers reveals a surprising fact of sexual abuse when teacher even are identified as rapist. Such violence and sexual

harassment by teachers and male classmates and even thugs from

The neighbourhoods undermine girls' ability and aptitude to participate effectively at school education. It also drives some of them to give up education and hence loosing their spirit of independence. Paradoxically they become dependent again upon the male members as designed by the patriarchal society.

Terrorizing women and eve teasing –

Terrorism is surely termed as an act of violence carried on innocent person to incite fear among them. It can noted mainly as a violent act and the issue of violence against women can be termed as equal to terrorizing women. Crime and violence against women causing terror prevails with very little justice done to them. Women are treated as slower, subjugated, battered, tortured and also killed which provide evidence of terrorism done against them. Killing and harming innocent women and girls are nothing but terrorizing them which in intentionally done to take control over them.

The snickers, gestures, glares, inappropriate touches happen too often on girls and women wherever they more which make girls and women feel humiliated and angry. In patriarchal society like India women's choicer and movement are restricted and any women here from young girls to middle-aged to old-aged women undergo harassment everyday named as 'eve-teasing'. This is apparently an innocent term for something serious that is harassing and assaulting for them which, in some extreme cases lead to abduction, rape, and also to suicide. The perpetrators come from different backgrounds from professionals, students, unemployed youths, illiterate persons etc. Who prove to be nasty, inhuman and persistent to partake in these activities.

Eve teasing is a social problem in India that originates from the way women are treated or assessed in the family or society. The issue of eve teasing and therefore terrorizing women suggest that freedom and autonomy of women are disrespected and they are not treated as moral beings. Human rights are violated here since women's potentialities are impeded and their securities. mortified. The issue is a serious are which needs to be addressed not merely from the perspective of legal procedure but also how ordinary people as members of the society perform their behavior towards girls and women avoiding teasing and committing violence to them. Certain duties and responsibilities, therefore, also lie upon the communities to take joint action to stopping such heinous crimes. It can be done both publicly and also from home where parents and guardians can teach their boys to show respect towards the girls. They can also support people who are bold enough to take

certain steps against those criminals and their indecent exposure towards girls and women.

Health and reproductive areas.

One of the basic factors for the inequality between women and men in every sphere of life is health, malnutrition and reproductive issue. Living and surviving through a normal cycle of life becomes a great challenge for women especially with poor financial support. Customary preference to feed men and boys is common in the families which restricts health security in community and society.

Women in India have neither the means nor the freedom to act on their own for their child's welfare and interest since their opinions are largely denied. The result of deprivation of health and nutrition upon women home negative impacts in that women fail to get access to all sorts of benefits and opportunist in family and social life. The reality they face, especially the rural poor women and also women with low income or living in urban slum areas is still as insignificant beings yet to receive the same status and equal access to every areas of life like male members of the society. "Women are found at the bottom rung of poverty, illiteracy, and landlessness," [Note : op.cit Mahatab, N., women in Bangladesh : From Inequality to Empowerment, P.20]. They remain marginalized in every aspect like education, health, etc. feeling vulnerable and turning to be the victims of violence.

II

Media's Role in empowerment of women in India.

Media is considered to be the most important tool of society in the modern times as it has the power to reach out to a large audience by mass communication and create an impact wherever it can reach, which now has become far and wide. Social media through its ever updating apps and networking is an inevitable source of influence on mass. The media at large has been instrumental though not to the degree desired in supporting the movement for women emancipation by focusing on the neglect and marginalization of the position of the women in society. Communication is extremely important for women's development and mass media play significant role. It is to be distinguished that growth of women's education and their entry into this business through employment has contributed to the growth of media. If Media can be a powerful agent of change, it can be an equally powerful agent of oppression. It is without a doubt a dominant medium for advocacy of gender equality and the status of women. Yet the

media can also reinforce stereotyped images of women and their roles in society. Women and their contribution to the society have always been overshadowed by the news of their hardships and atrocities inflicted upon them. It is indispensable that the print and electronic media present a balanced picture of women's diverse lives and contributions to society in a changing world. As media has huge influence on people, it should act with more responsibility before reporting and publishing any news. Portrayal of women which is derogatory to their image by media is an evidence of lack of gender sensitivity and has called for making them accountable for such representation of women. Such instances had led the National Commission for Women to recommend amendment in the Indecent Representation of Women (Prohibition Act) 1986. The government in a move to strengthen the legal machinery protecting the dignity of women, approved amendments to the Indecent Representation of Women (Prohibition) Act, 1986 in 2012. The aim was to include new technologies like MMS and the electronic media and some which were left outside the ambit of the Act like posters and TV serials which perpetuate stereotypes of women. Promoting a balanced and nonstereotyped portrayal of women in the media is very important to use it in a progressive way and avoiding the ill effects of any such medium of Media. Women's knowledge about media and access to and control over the various forms of conventional and modern media is still limited in most societies. The increase in the participation and access of women to selfexpression and decision-making through the media and new technologies of communication is in a way empowering women. The powerful and positive role that the media can play in the empowerment of women and gender equality should be supported and further explored.

Women and the Media

Objective

1. To increase the participation and access of women to expression and decision-making in and through the media and new technologies of communication.

2. To promote a balanced and non-stereotyped portrayal of women in the media.

During the past decade, advances in information technology have facilitated a global communications network that transcends national boundaries and has an impact on public policy, private attitudes and behavior, especially of children and young adults. Everywhere the potential exists for the media to make a far greater contribution to the advancement of women. More women are involved in careers in the communications

sector, but few have attained positions at the decision-making level or serve on governing boards and bodies that influence media policy. The lack of gender sensitivity in the media is evidenced by the failure to eliminate the gender-based stereotyping that can be found in public and private local, national and international media organizations. The continued projection of negative and degrading images of women in media communications - electronic, print, visual and audio-must be changed. Print and electronic media in most countries do not provide a balanced picture of women's diverse lives and contributions to society in a changing world. In addition, violent and degrading or pornographic media products are also negatively affecting women and their participation in society. Programming that reinforces women's traditional roles can be equally limiting. The world-wide trend towards consumerism has created a climate in which advertisements and commercial messages often portray women primarily as consumers and target girls and women of all ages inappropriately. Women should be empowered by enhancing their skills, knowledge and access to information technology. This will strengthen their ability to combat negative portrayals of women internationally and to challenge instances of abuse of the power of an increasingly important industry. Self-regulatory mechanisms for the media need to be created and strengthened and approaches developed to eliminate gender-biased programming. Most women, especially in developing countries, are not able to access effectively the expanding electronic information highways and therefore cannot establish networks that will provide them with alternative sources of information. Women therefore need to be involved in decisionmaking regarding the development of the new technologies in order to participate fully in their growth and impact. In addressing the issue of the mobilization of the media, Governments and other actors should promote an active and visible policy of mainstreaming a gender perspective in policies and programmes.

Limited coverage in Media

Newspapers cover women's problems drawing the attention of policymakers to issues requiring immediate attention such as the adverse sex ratio, infant and maternal mortality, crime against women and the effects of poverty on women and their families. But this coverage is very limited with the rest of the space occupied by cinema actresses, models, video jockeys (veejays) and the rich women and their hobbies. Many of the women's magazines are devoted to fashion, glamour, beauty aids, weight reduction, cookery and how to sharpen 'feminine instincts' to keep men and their inlaws happy. There are comparatively fewer articles on career opportunities, health awareness, entrepreneurship, legal aid, counseling services, childcare services and financial management. A study

in this regard was conducted in Jharkhand, Chattisgarh, Uttaranchal, Uttar Pradesh and Jammu and Kashmir. Two regional newspapers and two English newspapers were selected for the study. Prominent newspapers only publish 5% of women related issues and 8% are published on main page and remaining are placed inside. Study showed no importance is given to development issues of women. In the television serials women are the central characters, but they are portrayed largely as tormentors or the victims while the men very often take sideline and just seem caught in a web of unfavourable circumstances. Television culture has portrayed a breed of weak, indecisive men ensnared by sexy women when in reality men also play an active role in oppressing women in various ways including subjecting them to physical assault, rape, pushing them into the sex trade and even abandoning them. It is only desirable that serials should be close to reality and give message to the viewers where and how the society is going wrong.

This portrayal of women in media has led the National Commission for Women to recommend amendment in the Indecent Representation of Women (Prohibition Act), 1986. The NCW wants to include new technologies like MMS and the electronic media and some which were left out side the ambit of the Act like posters and TV serials which perpetuate stereotypes of women. Explaining the reason for including soaps in proposed amendment in the Act, National Commission for Women has stated that "women are either being portrayed as Sita (Ramayana) or as Kaikayee (Ramayana) and there seems to be nothing in between the two extreme characters being shown in Soaps. Divorces, adultery are highlighted frequently in Soaps where characters break the law without repercussion."

Negative images or just portraying reality is not enough. Infact, it can often be harmful. It has been observed that sheer duplication of the dark side of life can often lead to apathy and passivity. This can be avoided by depicting the positive images or success stories of women in whatever sphere they happen.

There is need to produce programmes that talk about income generating schemes for women. Unfortunately, in these kinds of ventures typical "womanly jobs" like papad-making, sewing, embroidery, pickles making etc. are propagated. Stress should be given on non-traditional skills which can break the myth that women are suited to certain kinds of jobs only. A systematic survey of the existing schemes (Government/nonGovernment) and presentation of the analysis and changes needed to upgrade the schemes which would make them more purposeful is essential.

The distance between women and media not only deprives the women of their right to information and knowledge but also keeps the women in the dark regarding the blatant misuse of the female and the distortion of the truth. Although the images of women as reflected by the different mass media in the country are not very different, it will be an interesting exercise to study how these images feed and reinforce the stereotypes.

The distortion of realities by the media has increased the gap of understanding between the different sections of society. Effective informative communication is one of the most important channels for the growth and development of women in the informal or unorganized sector, as without information regarding services and benefits available through legislation, government schemes, banks and voluntary organizations, women can hardly take advantage of them. Thus the media should take into consideration the following points.

(i) The media must project the working women in the unorganized sector asworker and not merely as performing the duties of wife/daughter. They being major earners, they must be projected as producers and not merely consumers.

(ii) The media should make deliberate attempts to not only project the problems of women in poverty, but should monitor in such a way that conflicting role models are not depicted, nor derogatory references to their work are made.

(iii) To improve content and coverage, coordinated efforts for increased interaction between NGO's, women's social action group, research organizations, institutes of mass communication, and the media personnel should be developed.

Various studies were undertaken on the women and media to ascertain how the media portrays women and how the women related issues are presented, how much significance is given to them. Such study ha revealed that issues pertaining to development of women are never emphasized adequately. Women are portrayed not for feminine beauty and artistic portrayal but for infusing sex appeal more often than not entering the arena of obscenity. It is necessary to have dispassionate in-depth study by social activists and media to ascertain why obscenity has risen so much in media. Unless there is any change in the social perception of women, it will be difficult to curtail obscenity in media.

Women Journalist

In such a rapidly changing environment, women in media have a large responsibility in not only changing attitude towards women but also shaping public opinion. With women holding responsible position in newspapers or electronic media, their competency should extend to a wider area and a range of issues. More importantly, a woman journalist is expected to show more sensitivity to issues relating to women and to more meaningful insights and perspectives.

Like most professions, in the media too, women have struck out boldly, beating a path, which is both impressive and inspiring. The last five years have seen them pouring out into the mainstream, acquiring hitherto unattainable positions and proving their mettle, be it the print or the television media. In short, women have become indispensable in the field. Women's organizations and media groups must play an active role in promoting this change. It is heartening that a wide variety of women's media initiatives are making a positive impact.

Women have been latecomers in media profession owing to social, religious taboos which operated as social sanctions. The employment of women in media assumes crucial importance at this juncture of our economic development. Beside Independent Public Corporation of Media (DD&AIR), the private owners of TV channels with ownership of Terrestrial outlets and satellite up linking facilities in country itself have flourished. This has brought a boom in employment thereby increasing the percentage of women media professionals.

The rough estimates however show that although the number of women in both the media has increased in absolute terms, their ratio to men has more or less remained static. A deliberate policy for ensuring adequate representation of women both in the public and private sectors of the media is therefore a must, not only for giving women a source of livelihood but also to ensure their adequate and effective representation, and to make the media truly national and representative in character.

A significant number of women journalists are very successful in magazines dealing with various problems of women and child. With sensitivity and skill for analyzing events in depth, issues such as women abuse and exploitation, harassment of women at workplace and the trauma of HIV infected women, female infanticide in rural areas find a prominent place in such magazines. The magazines deal with the issues more in depth compared to newspapers and women are considered competent to handle such stories. As per a study in the NCR there are around 900 women

journalists and even in cities like Chennai the number is impressive 200. Journalism is no more a male domain. This new trend has also led to a change in the portrayal of women in the media in general and newspaper in particular. It will not be out of context to mention here the success of 'Khabar Lahariya'. A group of eight women belonging to backward class bring out this paper from the Bundelkhand region. This paper which is being funded by an NGO was started with an aim to encourage women to fight for their own rights. such kind of initiative are required in every nook and corner of our country, so as to empower the women at grass root level.

The risks women in the media face, both in the urban and rural areas, have also to be seriously considered. As we move down, from the metropolitan towns and the state capitals, the risks increase. At the district and taluk levels, from where the bulk of the print media is published, and which are more news-worthy places for the local and regional news contents, there is more conservation, more rigid social outlook and greater resistance to social change and new trends. In these areas women join new professions like journalism sparingly. In remoter rural areas a woman journalist and particularly a reporter is a novelty not easily accepted and assimilated in the social milieu. The result is media women have to work almost in isolation particularly at the ground levels, if they are at all employed. The cases of sexual assault and harassment of women reporters are very often reported. Women in such cases have to take a calculated risk in joining the profession. Odd hours of job make the women journalists vulnerable. The murder of Ms. Soumya Vishwanathan, Producer of News TV channel in Delhi shows women journalist workers are more exposed to the risk of physical assault, even their life.

With the rapid expansion, almost a proliferation of the electronic media through satellite channels, with the popularity of the FM on the radio and with the growth of the print media, notwithstanding the electronic media, now there is a good scope for absorption of both men and women qualified journalists in various media outlets. Women, young and old, are prepared to weather the risks. The society, therefore, must make arrangements to provide adequate security to the vulnerable section of women in the media to promote their participation at all levels.

Everywhere the media has the potential to make a far greater contribution to the advancement of women. They can create self-regulatory mechanisms that can help to eliminate misleading and improper gender based programming.

Media, which wields immense power in a democracy-a power which is only expanding and not diminishing, needs carrying out a focused attention

about women-related issues and the portrayal of women. It is, perhaps, necessary that the stabilizing force of women must be brought home to the Indian people. In every family and society, there is an ethical and spiritual space, which has been traditionally dominated by women. The principal character in Bernard Shaw's Pygmalion bemoans, 'why can't woman be like man!' The media can play a salutary and a liberating role to give to the women the distinctive and the exclusive space, which must belong to them to enable them to generate the ethical and moralizing impulses for the entire society.

Actions to be taken

By Governments and international organizations, to the extent consistent with freedom of expression:

a. Promote research and implementation of a strategy of information, education and communication aimed at promoting a balanced portrayal of women and girls and their multiple roles;

b. Encourage the media and advertising agencies to develop specific programmes to raise awareness of the Platform for Action;

c. Encourage gender-sensitive training for media professionals, including media owner and managers, to encourage the creation and use of non-stereotyped, balanced and diverse images of women in the media;

d. Encourage the media to refrain from presenting women as inferior beings and exploiting them as sexual objects and commodities, rather than presenting them as creative human beings, key actors and contributors to and beneficiaries of the process of development;

e. Promote the concept that the sexist stereotypes displayed in the media are gender discriminatory, degrading in nature and offensive;

f. Take effective measures or institute such measures, including appropriate legislation against pornography and the projection of violence against women and children in the media.

By the mass media and advertising organizations:

a. Develop, consistent with freedom of expression, professional guidelines and codes of conduct and other forms of self-regulation to promote the presentation of non-stereotyped images of women;

b. Establish, consistent with freedom of expression, professional guidelines and codes of conduct that address violent, degrading or pornographic materials concerning women in the media, including advertising;

c. Develop a gender perspective on all issues of concern to communities, consumers and civil society;

d. Increase women's participation in decision-making at all levels of the media. By the media, non-governmental organizations and the private sector, in collaboration, as appropriate, with national machinery for the advancement of women:

i. Promote the equal sharing of family responsibilities through media campaigns that emphasize gender equality and non-stereotyped gender roles of women and men within the family and that disseminate information aimed at eliminating spousal and child abuse and all forms of violence against women, including domestic violence;

ii. Produce and/or disseminate media materials on women leaders, as leaders who bring to their positions of leadership many different life experiences, including but not limited to their experiences in balancing work and family responsibilities, as mothers, as professionals, as managers and as entrepreneurs, to provide role models, particularly to young women;

iii. Promote extensive campaigns, making use of public and private educational programmes, to disseminate information about and increase awareness of the human rights of women;

iv. Support the development of and finance, as appropriate, alternative media and the use of all means of communication to disseminate information to and about women and their concerns;

v. Develop approaches and train experts to apply gender analysis with regard to media programmes.

Conclusion

The role of Media is very important to accelerate Women empowerment which will lead to economic empowerment of women. The Mass Media, however, like all social media, are good and practical means to increase, through the dissemination of healthy concepts of being woman, of what is the role of women in modern society, of good examples that women give us every day, of the results they have achieved and continue to reach out to

women in many fields of economics and beyond, the social consideration of women, giving to young women good ideas and examples for their economic empowerment. Mass Media could also make a strong contribution, with the implementation of media campaigns, to the disseminati on of the concept of gender equality. If people see in the media the overcome of the differences between men and women will bring him back into everyday life. The Mass Media have always unconsciously affected and influenced the thinking and behavior of society. Media should focus success stories of established, successful & renowned women inspite of indecent representation of women. As an important agent of socialization shaping of gender roles, its mechanisms for checks and balances with respect to gender need to be strengthened. The media should enable projection of women in a decent and dignified way and promote respect and dignity to women avoiding negative portrayal of women. The media professionals need to be sensitized on gender issues and a system of rewards may be developed for those who are able to portray women in positive manner. Likewise, stringent punitive action should be taken against those who defy the norms. New innovative decent presentation of women, based on Indian culture and society through media must be introduced. A strong legislative effort coupled with a wide spread social awareness with morality and ethics is needed to fight this menace so that women are not perceived as a commodity but as individual with right and dignity.

"There is no chance of the welfare of the world unless the condition of the women is improved. It is not possible for a bird to fly on one wing."
        -Swami Vivekananda

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Exploring Ancient Indian Forests : Types And Terminologies

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From the ancient time forest and forest people indirectly helped us in the progress of our civilization. Forest was an enigmatic space, sometimes to be feared but at times to be engaged with. Thus, forest was a place for exile in our epics. Vana (forest) was complementary to the Ksetra (settled area). In this space there were people who made Vana their home but also were exposed to Ksetra. However, just as there are many terms relating to the 'forest', there could be many terms regarding what 'forest' represented. The forest was seen in multiple ways, and historical changes altered the focus. When the demands of civilization began to impinge on the forest, the perceptions of the forest and its terms and terminologies also changed.

Keywords : Aranya, Dandakarnya, Pancavtai, Kupyadhyaksa, Nagavana, Brahmaranya, Puropavana, Jetavana, Arthasastra, Tapovana, Atavi, Pakshivana, Vyalavana, Vanasimha.

There are many ways in which forests have been perceived both in written sources of early India and modern historiography of analyses of such sources.[1] The most general characterization of the forest is derived from its terminological contrast with other types of space; if forest was aranya, vana, atavi, jangala and so on in text, it stood in contrast to areas which were different, such as ksetra, janapada, nadu etc., suggestive of space with greater human civilizational associations but nevertheless deriving many elements from the 'forest'.[2] In fact despite the contrast, the 'forest' is seen to be complementary to existence in other spaces, encompassing both material and transcendental dimensions of being. However, just as there are many terms relating to the 'forest', there could be many terms regarding what 'forest' represented. For example, in the early Indian medical tradition, 'the communities of living creature that share the conditions of life in a given place',[3] Jangala was not simply a verity of forest but a space in which the combination of men, animal, birds, trees and climate constituted a set different from that in forest spaces in anupa or marshy areas. Similarly, in early Tamil tradition, suggested by anthologies of poems of Sangam, a zone such as the kurinci – the zone of forested mountains- also signified the nature of a community at a particular subsistence stage of existence

practices, its habitat, its deity and rituals, and the way the community could have had channels of communication with marginal forest spaces and their communities.[4] The initial point then is that there could be varieties of perception of the forests which, although there were differences between them in available perceptions, all seem to have derived, in essence, from there linkage to human existence.[5] In the Budddhacarita, vana and aranya usually mean forest, vana also refers to other kinds of spaces. Along with kanana and udyana, it is used for pleasure gardens or parks-manicured spaces with pavilions and ponds.[6] In our texts a number of groves are known as vanya, vanasamuhah. In the Amarakosa, for forest, the term used is *aranyāni*, vipina , kanana, ghana, satra and so on, emphasizing that it is a large one. Kantara means that the forest is difficult to traverse. These names underlines its diversity.

In the Vedic period people were well-versed with forest and forest life. Caturasrama was the main four life phases of Vedic people. The last two asramas which were Vanaprastha and Sanyas were mainly associated with forest area. In later Vedic period the text Aranyaka also derived from Aryana means forest. Each village preserved sections of forests (Srivana) for their own specific needs. These forests were different from the Mahavanas, the wild forest or jangala, because they were open for exploitation and harvesting according to strict ecological practices. These were the forests of wealth and the basis of community's prosperity. No village was complete without its corresponding woodlands in and around its houses.[7] The forest is naturally called Aranyani as in the dichotomy of nature and culture, which the forest and the settled society often seem to represent, the former is usually considered feminine and the latter masculine. In the epics we find various types of forests. Aryana Kanda of Ramayana and Vana Parva of Mahabharata also indicate the significance of forest at that time.

Various type of forest in our epics are Dandaka forest or Dandakarnya, Taraka forest or Tarakarnya, Citrakut forest, Matanga forest , Madhu forest, Naimisa forest, Dvaita forest, etc.

Dandakaranya is a historical region in India, mentioned in the Ramayana. It is identified with a territory roughly corresponding to the Bastar division in

It is identified with a territory roughly corresponding to the Bastar division in the Chhattisgarh state in the central-east part of India. Dandakaranya roughly translates from Sanskrit to 'The Jungle (aranya) of Punishment (daṇḍakas)'. Dandakaranya, means the Dandak forest, the residence of the demon Dandak.[8] It was the location of the Daṇḍa Kingdom, a stronghold of the raksasa groups. It was a state of the Lanka Kingdom under the reign of Ravana. Ravana's governor Khara ruled this province. Rāma killed him along with the fourteen others demons.[9]

Dandakaranya was also known as a Maharanya. Many accounts of the region describe ancient peoples of India and various deities living together in shelter there. The Dandakaranya the plot for the divine objectives to uproot the raksasa from the land was formulated here. According to the Ramayana, it was the habitat to many demons. Exiled persons resided here and sages had to cross it in order to reach the Vindhya Mountains. Rama, his wife Sita and his brother Laksmana spent early years of fourteen years as exiles traveling around the region. Within Dandakaranya we have the description of Pancavtai forest. Rsi Agastya advisede Rāma to established his hermitage in Pancavṭai forest.[10] Fruits, flowers and water were easily available there. This forest was very pleasant in environment. There were various types of trees which separate or make it exceptional from the others forest.[11]

We also got the information of a dense and very fearsome forest of Taraka or Tarakarnya. Rsi Visvamitra requested Rama to kill demon Taraka and free this forest from her domination.[12]

In the Ramayana Citrakuta forest was situated in the Citrakuta mountain. Rāma said that he forgot any previous pain like leaving the kingdom or separation from friends due to the pleasant and beautiful environment in this forest.[13]

Matanga forest is situated beside the Pampa Lake. This forest was very unique in the world. The Nagas are not able to cross that forest for the power of Rsi Matanga. That's why the name of the forest was Matanga forest. It is that of the immortal mendicant women, by name Sabari, who had a

hermitage on the western side of the Pampa lake showed the Matanga forest to Rama and Laksmana, which was very dense and full of birds and animal. This forest was also a place where the sages conducted their sacrifice and involved with the study of Vedas.[14]

We also find the beautiful description of the Asokavana in Lanka.[15] Valmiki also used the term Strivana (Sundar Kanḍa, Swarga ix, Sloka.65) for the women harem or seraglio of Ravana.[16]

Madhu Forest or Madhuvana was a dense forest in ancient northern India, west of Yamuna.

According to the Ramayana, an Asura named Labanasur, ruled this forest and its territory. But he was defeated by Satrughna one of the brothers of king Rama. Satrughna later cleared this forest and built a city called Madhupuri or Mathura here. This later became the capital of Surasena Kingdom as in the epic Mahābhārata. We also get the information that the forest name Madhuvana also well-known for honey (Madhu).[17] which was supervised by the one of the Vanara leader Dadhimukha. But the troops of Vanaras of Angad destroyed this forest.

Naimisaranya also referred as Naimisa is a sacred forest often mentioned in both the Ramayana and the Mahabharata. The ancient forest corresponds to modern day Nimsar situated along the Gomti River in Sitapur district of Uttar Pradesh. It is the place where Puraṇas had been narrated for the first time before a large gathering of sages. Sometime rsi Sounak was the land lord of this forest.[18]

The Brahmanas derive the name Naimisaranya from 'nimisa', "a twinkling of the eye"; hence Naimisaranya means 'a forest or pool where in the twinkling of an eye sage Gauramukha destroyed an army of Asuras.'

According to Devi Purana there are nine sacred forest in early India, these are Saindhab, Dandakarnya, Naimisya, Karu jangal, Utpal Aranya, Jambumarg, Puskar, Himalaya, Upalbrita Aranya.[19] In the Varaha Puraṇa,

it has been described as the region where Daityas (demons) were killed within a nimisa (smallest unit of time) and the place was made an abode of peace.

In the Adi Parva of the Mahabharata, the forest is mentioned as situated towards east (pracim disam) of the mountain regions of Himavat which contained many sacred spots. In the epic, there are frequent references to Rsis living in Naimisaranya and performing sacrifices extending for years.

Dvaita Forest or Dvaitavana is a place from Hindu mythology featured in the Mahabharata. It includes Dvaita Lake within its boundaries. The forest is described as lying south of Kamyaka Forest on the banks of the Saraswati river, placing it on the southwestern outskirts of the Kuru Kingdom and near the borders of the Thar Desert.[20] Dvaita is derived from Dvai, which is a vriddhi (elongated form) of Dvi, which means 'the mind associated with Prakṛti and sacrifice', a reference to the Yoga system of thought.[21]

Kamyakavana was situated on the western boundary of the Kuru Kingdom, on the banks of the Saraswati River. It lay to the west of the Kurukṣetra plain. It contained within it a lake called the **Kamyaka lake**. Kamyaka forest is mentioned as being situated at the head of the Thar desert, near the lake **Trinavindu**.[22] Vima defeat the demon Kirmmir and free this forest from his control.[23] The Paṇḍavas came back from the Dvaita forest to Kamyaka again for a second time. This time they lived without Arjuna who had been to the northern Himalayas. They came back from there with Arjuna among them and entered the Kamyaka forest for a third time.

Before entering Kamyaka this time, they had also spent one year in the forests of **Visakhayupa** to the north of Kamyaka. The Paṇḍavas again shifted to the Dvaita forest and came back to Kamyaka for the fourth time, seeing that the deer population near the Dvaita lake was declining due to their presence there. During this time Jayadratha, the king of the Sindhu Kingdom, on his way to the Salwa Kingdom passed through the Kamyaka forest. He tried to kidnap Draupadī but the Pandavas prevented that

attempt.

As told in the Mahabharata, during the initial years of their twelve years exile, the Pandavas come to Dvaita Forest from the Kamyaka forest to avoid frequent visits by the people of Kurujangala, arriving at the end of summer. They eventually return to Kamyaka.

After their pilgrimage and the return of Arjuna from the northern Himalayas, they live in Dvaita a second time. Duryodhana comes to see them under the pretence of inspecting the cattle-stations of the Kauravas in the vicinity. When he reaches Dvaita Lake, the Gandharvas imprison him; he is released by the intervention of the Pandavas.

Owing to the decline of the deer population, the Pandavas again move to Kamyaka Forest, but return to Dvaita for a third time during their twelfth year of exile. There they send their followers away and depart for Matsya to spend their last year of exile anonymously.

Khandava Forest or Khaṇḍavavana or Khandavprastha, was an ancient forest mentioned in the epic Mahabharata. It lay to the west of Yamuna river, in modern-day Delhi territory. Khanda village in Kharkhoda tehsil of Sonipat district in Haryana state was named after the Khandava Forest. Pandavas cleared this forest to construct their capital city called Indraprastha. This forest was earlier inhabited by Naga tribes led by a king named Taksaka. Arjuna and Krsna cleared this forest by setting up a fire. The inhabitants of this forest were displaced. This was the root cause of the hostility of the Naga Takṣaka towards the Kuru kings who ruled from Indraprastha and Hastinapura.[24]

Arthasastra gives a clear understanding of different types of forests. Thus four broad types of forests, under the care and supervision of the state authority, are envisaged by Kautilya.

i. pasuvana – The forest was reserved for wild animals. Or the enclosures for beasts or the grazing land.

ii. hastivana- The forest was reserved for elephants. According to this forest was situated in the border of the state. That is also stated as Nagavana.

iii. dravyavana.- This forest also a reserved forest. Various products like wood, Sandal wood, Medicine, etc. collected from this forest.

iv. mrgavana - The forest was reserved for deer. Probably king went to this forest for hunting.

पुष्पफलवाटषण्डकेदारमूलवापास्सेतुः ।
पशुमृगद्रव्यहस्तिवनपरिग्रहो वनम् ।
गोमहिषमजाविकं खरोष्ट्रमश्वाश्वतराश्च व्रजः ।
स्थलपथो वारिपथश्च वणिक्पथः ।
इत्यायशरीरम् ।

<center>Arthaśāstra.(II.6.6)</center>

Hastivana suggests the creation, conservation and preservation of an elephant reserve forest, obviously recognizing the great importance of the animals in wars. That the Mauryas did maintain such reserve elephant forest is evident from the reference to nagavana (elephant forest) in an edict of Aśoka.[25] The Arthasastra however lays greater emphasis on the material forests (dravyavana) which were to be looked after by the Kupyadhyaksa (officer in charge of forest or forest products). In the category of forest products, the text includes different types of woods (daruvarga), canes and cane wares (venuvarga), ropes from plants (rajjubhandha) etc.

The Collector-General shall attend to the collection of revenue from the forts (durga), country-parts (rashtra), mines (khani), buildings and gardens (setu), forests (vana), herds of cattle (vraja), and roads of traffic (vanikpatha).

Flower-gardens(puspabat),fruit-gardens(phalbat),vegetable gardens (Sanda), wet crop fields (kedar), and fields where crops are grown by

sowing roots for seeds (mulavapah) sugar-cane crops (bat), etc. come under setu(irrigation works).The taxes accumulated from that fields are called Setu.[26]

In the Arthasastra vana is the name of taxes which accumulated from four forests.[27] The name vana as a tax also indicates the significant of forest in ancient time.

It is said in the Arthasastra that the revenue had been spend for the preservation of various forests like Pasuvana(Animal Forest), Mrgavana (Dear forest), Pakshivana (Bird Forest), Vyalavana (Tiger forest), Kastabata or Kastavana (Timber forest), Trnavat (Grazing land for cow or buffalos).[28]

पशुव्यैरथद्विपपरिग्रहो गोमण्डलं पशुमृगगर्हिव्याळवाटाः का-
छ्तृणवाट [?] श्चेति व्ययशरीरम् ।

<center>Arthasastra.(II.6.4)</center>

Kautilya also advised that the barren land should be transfer to the forest or Grazing land. This land should be used as Brahmaranya, which was utilized for the study of Vedas by the Brahmanas and Somaranya, which was make used for the sacrifice of Soma by the Brahmanas. And this land also used as Tapovana which was peaceful habitation for the austerities of sages.[29]

This is clear that Kautlya indicates various types of forest and also gave advice for spending money for the establishment and preservation of forests. Kautilya explained about the need of forest administration and how the forests are important for a successful and strong kingdom. All though Kautlya want to preserved the natural resource for state but there was some indirect indication for save the nature.[30]

Kautilya also stated that Upavana or Brksasthan should be situated beside the palace and we have reference to another Upavana or Puropavana situated beside the city or the territory of state. It says, if anyone cut down any branches of trees of this forest, they should be punished. No doubt this type of forest was artificially created by royal power. State also organized

the reserved forest or Abhayaranya for the animals. It is said that deer, Buffalo, bird like peacock, fish etc. which animals are not permitted for killed or hunting, if any one tied or killed them they should be punished by the king.[33]

Various types of forest in the Arthasastra.

Name of the Forest	Explanation
Pasuvana	Enclosures for beasts or the grazing land
Hastivana or Nagavana	Reserved forest for elephants
Dravyavana	Reserved forest various forest products
Mrgavana	Reserved forest for deers
Paksivana	Forest for birds
Vyalavana	Forest for tigers
Kastavana	Forest for timbers or woods
Tapovana	Forest for the austerities of sages
Bramharaṇya	Forest for study of Vedas by the Brahmanas
Somaraṇya	Forest for sacrifice of Som by the Brahmanas
Abhayaraṇya	Reserved forest for animals
Upavana or Brksasthan	Manmade small forest beside the Palace
Upavana or Brksasthān	Manmade small forest in the city

So if we go through the stories of epics, we got various type of forest mainly based on the name of any sage or demon. The forest of demon is more fearful than a forest of Sage. We saw a conflict between sages and demons for the domination on the forest area. The sages also took the help from kings for defeating the demon and establish a peaceful environment for their austerities. Rama explained to Sītā that those who disturbed the sages they were the enemy of Rama.[34]

Sometime the forest was handed over as a gift; for instance, one of the rich gahapati Anathapindaka made a gift of the pleasure garden Jetavana to Gautama Buddha.[35] This forest name also associated with its landlord, Jeta. In the Vikramorvasiyam of Kalidas Nandanavana also indicates the forest for enjoyment.[36] Basabadatta of Subandhu also showed the same.[37]

In early and early medieval India the term Tapovana was also used in the literary sources. This represents the unique characteristic of Indian culture. Far away from the locality the sages peacefully involve practice meditation there. Achieving the blessings from the supreme power was the goal of their pursuit. This forest was totally barred from violence, envy, sin, and laziness and was full of devotion, honesty, discipline, and nonviolence.[38]

According to Kautilya the land which is not use as an agricultural land, should be used as a pastoral land, garden, elephant forest, deer forest, and Tapovana for the Brahmanas. We came to know that Brahmanas shall be provided with forests for soma plantation, for religious learning, and for the performance of penance, such forests being rendered safe from the dangers from animate or inanimate objects, provided with only one entrance rendered inaccessible by the construction of ditches all round, with plantations of delicious fruit trees, bushes, bowers, and thorn less trees, with an expansive lake of water full of harmless animals, and with tigers (vyala), beasts of prey (margayuka), male and female elephants, young elephants, and bisons—all deprived of their claws and teeth—shall be formed for the king's sports.[39]

From the Sanskrit literary sources we learn that not only the human beings, the dangerous animals were tamed in the unique environment of the Tapovana. . Probably this is done by the forest people because they are very much skilled for the training and taming of the animals.

We get lots of āsrama in Sanskrit literature situated in forest area with their self-sufficient life. In Abhigyansakuntala we got the description of a Tapovana. Here we get Tapovana as a divine incarnation of forest. Kalidasa depicts a self-sufficient forest life. Śakuntalā begs before the forest for the dress, costumes, and jewelry before going to her husband's house. Rsi Bharadvaja prays for foods, drinks and clothes to forest and river for maintenance of guest.[40] Kumarsambhaba of Kalidas also represents the pleasant environment of Tapovana.[41] In the Buddhacharita of Asvaghosa give a detail picture of Tapovana and the activities of sages in the Asrama of Tapvanan.[42]

In 'Perceiving the forest', Thapar brings to the fore a clear historical viewpoint that defines how textual references to the forest can be seen as part of a continuum as well as a part of change in terms of the forest and its

inhabitants. There are four major ideas that Thapar articulates: i) an initial fear of the forest. ii) the forest as a site for exile, conquest and hunt iii) as a zone for setting up asramas and iv) as a target for continual state interference and control.[43]

Inscriptions also supplement literature with regard to terminologies of forest. Forest is represented in inscriptions as Vana, Jangala, Atavi, Aranya etc. In the inscriptions of the Aśoka (3rd Century B.C.E.) represented Ataviya, (Inhabitants of the Forest)[44] or in the inscription of the Samudragupta (4th Century C.E.) represented the term Atvika rajasya (forestkingdoms).[45] In the inscriptions of Maharaja Samkshobha 6th Century C.E.) again we got the term ashtadas-atavi-rajya (eighteen forest kingdom).[46] the Inscription of Paramara Chamundarāja (11 th Century C.E.)[47] represents the term Atavika (Forest people) and the Inscription of Paramardi Deva (12th Century C.E.)also used the same term for forest people. This is significant that from the ancient to early medieval period the term Atavika was used mostly for forest people in Indian inscriptions.

It is interesting that sometime the various term of forest have been represented with the name of kings, feudal chief or Government officer like Jangalapati or the ruler of Jangala or forest, Atavidurjaya, Paramara king Aranyaraja, fragmentary grant of Paramara represents the same. King Vanapala of Bengal, Vanapati, Vagulika (Bearer of the king's betel box) Vanasimha, Some time we got specific place or village with the term of forest like Atavipataka,[56] etc.

Thus vana and the variety of terms used along with it signify frequent human association, which gradually transformed such spaces in to a habitable space. The forest spaces of early India changed with State's intervention and societal needs. Thus new terminologies were created specific to the functions of the forest space. Through these terms of forest we perceive an evolution of forest geographically, politically and conceptually.

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Privatization Of Indian Railways: Need, Methods And Consequences

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Abstract
Indian Railways acts as the largest transport network in India and one of the largest railway networks in the world. Although started as a private railway service, it is serving as a departmental undertaking of the government of India since 1946. Indian Railways carries a huge number of passengers as well as a huge bulk of goods. The freight service earns sufficiently large revenue but the passenger service cannot as due to lots of social obligations passenger fare cannot be increased with a view to maximizing the profit. In fact, the cost of operating the passenger services is covered by the surplus revenue generated by the freight service. As a result of these factors, railways have been experiencing very little and unstable growth which calls for reform and even for privatization of Indian Railways. But privatization of railways has some adverse effects on passenger services. This article discusses the needs for reform and privatization of Indian Railways, different methods of privatization that other countries have adopted and their advantages and disadvantages and the consequences of the privatization of Indian Railways.

Introduction
Indian Railways (IR), introduced in the year 1853, was initially managed by private companies. From 1946, it was taken by the Government of India. Since then, the union or central government is solely responsible for the operation and management of the railway. Since its inception, IR has increased its routes to a large extent. Presently, it operates on more than 68000 kilometres of routes. The number of passengers has also increased manifold. Besides passengers, it carries a huge amount of goods every year. One of the distinctive features of the operation of IR is that it is operated on the basis of cross-subsidization. Cross subsidization simply means that the revenue earned from freight traffic and from passengers travelling in higher classes is used to finance the cost of operation of local short-distance trains in suburban railways, keeping the fare of suburban trains and lower classes

higher class of railways to shift to airways. These have restricted the growth in revenue available for cross-subsidization. In short, in recent times, IR is not able to make enough profit as expected. This situation has made the authorities encourage private investment in different sectors of the Indian Railway.

Need for privatization

It has been observed that railways during the last few decades are worse-performing based on some indicators. The following graphs show that the IR, in terms of the following indicators Earnings from passengers, Earnings from Goods, measured in Rs. million, Net earnings, measured as the total earnings net of all working expenses and indicates the picture of profit or loss of railways. Total freight traffic, measured in thousand tonnes and Train Density, a proxy for Productivity (Gokarn,2007), measured as having experienced very little or moderate growth rates over the years while in some years experiencing negative growth. The net earning experiences very unstable or sometimes negative growth. This calls for a reform in the operation of IR which nowadays has been transformed into a demand for privatization of IR.
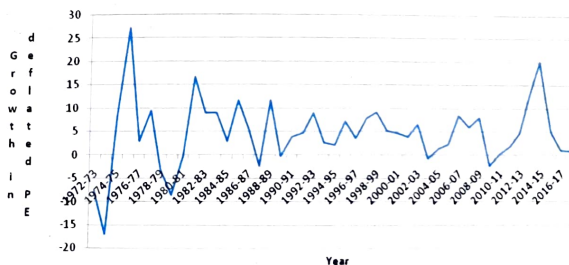

Graph 1: Growth in Total Traffic
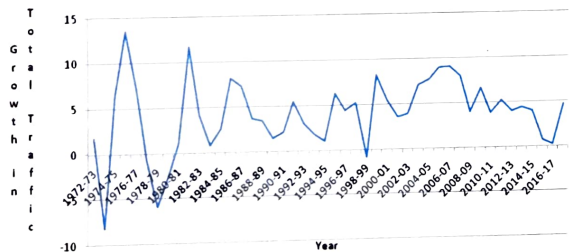
Data Source: Statistical Yearbook of India, Railways, MoSPI

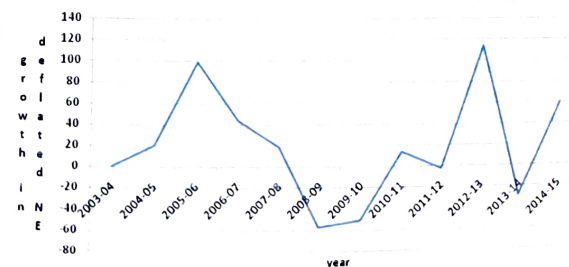**Graph 2: Growth in deflated Goods Earnings(GE)**
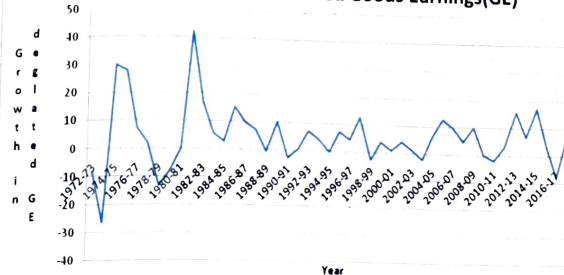
Data Source: Ministry of Railways, Government of India

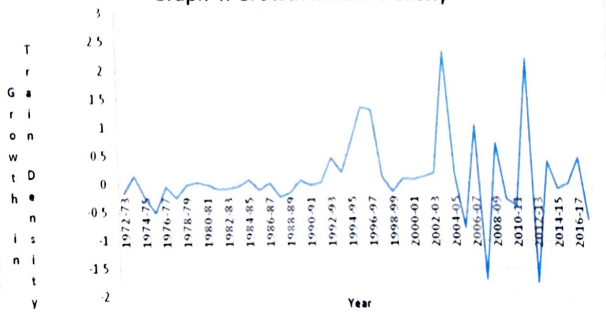**Graph3: Growth in deflated Passenger Earnings(PE)**

Data Source: Ministry of Railways, Government of India

Graph 5: Growth in Deflated Net Earnings(NE)

Data Source: Ministry of Railways, Government of India

Graph 4: Growth in Train Density

Data Source: Statistical Yearbook of India, Railways, MoSPI

The possible reasons for such poor performance are:

The railway is operated using the method of cross-subsidization. The passenger service, especially the suburban passenger services, are extremely underpriced which means for these services the price charged is sufficiently lower than the cost. This loss is covered by charging higher prices for non-suburban higher class passenger services and for freight operations. Now, the development of roadways for freight and airways for passengers has caused a loss in the demand for such higher class passenger services and freight services of IR which are priced sufficiently high.

Moreover, concentrating more on some specific commodities and avoiding some commodities, especially the manufactured goods which could have paid high price has caused another loss of opportunity to gain more. Ajita Mattoo (2000) said that there has been continuous discouragement by the railway management for those commodities. The "other goods" category, in 2000, constituted only 3.96% of the entire rail traffic which is only 7.2% (Ministry of railways, government of India) in 2020 and is mostly moving by roads.

For the commodities IR carries most, it has also lost market share. According to Mattoo(2000), between 1986-87 and 1997-98, the percentage of the total movement of coal that moves by IR has declined from 47.8 to 37.73 and that for cement has declined from 61.74 to 43.

In the year 1981, The Railways Reform committee, headed by H.C. Sarin, was formed with the interest to prescribe some reform policies for IR to enhance efficiency in terms of both operation and revenue generation.

Sriraman (2007) argued that, after the recommendation investment has been made to increase revenue and attempts have been made to pursue commercial interests. Subsequently, several other committees like Nanjundappa committee of Railway Freight and Fare in 1993, Railway Capital Restructuring Committee, headed by A.V. Poulose (1994), Rakesh Mohan committee, 2001, Expert Committee on PPP Funding, headed by Amit Mitra in 2009 were formed to investigate the performance of IR and give suggestions for better performance. All committees were in the opinion of initiating some reform measures in IR to increase its profit. But the effects of such reform were not fully realized as was expected. While some parameters like track utilization, wagon utilization showed marginal progress, some of the others like average speed of trains, average freight train loads have shown hardly any improvement. As, even after some reform measures, the railway is not been able to generate sufficient revenue consistently, since the last few years there is a thought of privatizing it though not entirely at a time. Some of its services have already been taken over by the private enterprises but, whether total privatization of Indian Railways would be a wise decision is a huge matter of concern in the present economic and political scenario of India.

Methods of Privatization

To focus on the matter of privatization, let us make a clear distinction between privatization and deregulation.

Deregulation means the abolition of all forms of institutional, legal or statutory obstructions to the entry or exit of firms in a given industry irrespective of who owns the firms. The aim of such a policy of deregulation is to promote competition in the product or service market. Privatization, on the contrary, implies the transfer of ownership rights from the public to the private sector. Such transfer may take the form of handing over the ownership to a single individual or firm or a group of firms in the private sector, which may occur even in the absence of a capital market, or a wider group of shareholders via the capital market. As deregulation does not transfer ownership, it can be done even with the coexistence of both public and private ownership of both the means of production and distribution.

Now, a competitive or contestable market is one in which existing firms are vulnerable to hit-and-run entry. A potential firm has access to the same production methods as that an actual or existing firm has, and hence faces the same cost functions. In a competitive industry, the entry of a potential firm does not involve sunk costs. This actually means that a firm can enter the industry without making irrevocable expenditures, and so there are no barriers to exit (Baumol, Panzar and Willig, 1982).

The difference between sunk cost and fixed cost can be understood in the

following way:

Fixed costs do not vary with the level of output. But fixed costs are not always sunk. Fixed costs might be avoidable, for instance, a firm, while renting assets from another market on short contracts, although, might well be embodied in items of equipment to the extent that the market supplying (renting) the equipment itself reflected 'sunk costs' of commitment to that market (Beesley,1986). It is possible that a competitive market with high fixed costs can have no sunk costs. And indeed a natural monopoly market can in principle be contestable and vulnerable to hit-and-run entry for this reason. (Dalvi, 1995)

According to Dalvi(1995), the history of the privatization of different industries in different countries across the world suggests two approaches: American and British.

The American approach suggests that, if an industry satisfies the contestability and sunk cost criteria, it can be deregulated and if the industry is a nationalized one, it can then be privatized. The British Approach, on the other hand, is based on a lot of criteria of which productive efficiency and property rights are the two most important. The main principle is that private enterprise can ensure better production efficiency than public enterprise. But this argument has some limitations. Firstly, that a private enterprise performs better than a public one is a matter of belief, not empirically proved. Secondly, the privatization of a public enterprise does not necessarily mean a change in the management board. Most often, the management officials remain the same even after privatization. So, there can be a lot of constraints that management faces under public ownership, not always, the inefficiency of management is a driving force of a public enterprise to perform badly. Privatization does not alter the efficiency or ability of the management; rather it helps to remove the constraints. Next, even if productive efficiency is considered to be the determining factor, it can be said that, while a private enterprise ensures productive efficiency, a nationalized enterprise ensures allocative efficiency which, in fact, cannot be ignored especially in underdeveloped nations.

Industries with no or very little sunk cost are generally fitted to the contestability criterion, where it can be claimed that, if the industry is making losses, privatization of it will turn it to be a profit-making one in pressure of competitiveness. But, industries with high sunk cost cannot be turned out to be competitive even it is privatized because entry to and exit from these industries are not costless. Indian Railway is an example of this type of industry. Moreover, railway involves economies of the network which makes cross-subsidization inevitable. Railway plays an important role in economic development in developing countries like India. There is a constant demand for opening new routes in the backward regions. IR opens or runs such lines by cross-subsidy to meet the transport demand of the

backward region or the lower income group people. Moreover, the local trains i.e. the suburban railways of IR charges very low fares in order to perform the same job. This is also done through cross-subsidization. Thus, as privatization, leading to competitiveness, leads to the abolition of cross-subsidy, privatization of railways is difficult to be rationalized with the above-mentioned approaches.

Possible consequences

Since independence, the performance of IR has been evaluated on the basis of their social contribution i.e. how far they have been successful in providing the access to transports to the weaker section of the population rather than on their financial achievements. IR has played a crucial role in the country's economic development and socio-economic integration. A number of non-commercial activities are carried out by it which benefit deferent sections especially the economically backward section of the Indian population. Moreover, IR contributes significantly to the process of employment generation. A huge number of the working population works in Indian Railways.

As IR acts as a departmental undertaking of the Government of India, it has no role in making investment decisions. IR is not allowed to borrow from the capital market. They are to make investments out of their internal fund, besides which they can borrow a very little amount from the central government in the form of non-refundable loan, on which, IR has to pay a percentage of their dividend to the government. Besides this, IR has to contribute to the general revenue of the central government.

These types of cross-subsidization and other obligations make railway inefficient in terms of financial performance. For this reason, various railway committees have recommended operating IR from a business outlook but none of these committees has recommended a proper way to do the same.

Because of the indivisibility nature of assets, the investment in railways is huge and actually beyond the private capacity. That is why it is very difficult to privatize it as a single entity. Helm and Thompson (1991) argued that private companies may face inadequate incentives to invest efficiently which may result in underinvestment in the creation of long-lived facilities and equipment.

Another problem as mentioned by Adamson et al (1991), is the problem of coordination between railway routes, platforms and timing. Subject to the size of the network of IR and the variety of operations, it is quite difficult to coordinate for different private companies. For example, if the right to railway paths are bought by one company and the access to the platform by

some others, then it will become very difficult to coordinate with respect to the availability of platform space with different operators operating in different routes. In the earlier years of Indian railways especially in the British period, when the operation of railways was done by private enterprises, the passengers used to face the problem of train change. In a much longer journey, people were to break the journey as they were able to go only up to a certain distance by train and to board into the connecting train which could take them to the final destination. Sometimes passengers had to break the journey more than once. Moreover, if the former train was delayed, the passengers often missed the connecting train and faced huge trouble. Privatization of railways can bring this situation back which in today's fast-moving life can create a total mess. This problem can only be solved if the entire operation is sold to one company which actually implies a monopoly. A private monopolist will definitely try to maximize its profit by reducing and eventually by stopping the non-commercial activities and even avoiding the mechanism of cross-subsidization.

As mentioned by Dalvi(1995), if IR is to be privatized at all, it may follow the Japanese model. Following this model, IR can sell different zones to different operators which will reduce the problem of coordination. But there is also some operational problem. All the zones are not equally economically viable. In some of them, a private company may fail to generate enough revenue to cover their operating cost because of not having enough traffic. The government have to provide subsidies in such cases. Dalvi (1995) is of the opinion that, although privatization of IR is not a readily viable option, it can be transformed into an independent public corporation from a departmental undertaking. If it is turned into a corporation, there will be a change in the relationship between the management and the government which actually would depend upon the nature of the objectives that the corporate managers would have to maximize, the extent of freedom that the management would enjoy and the nature of the incentives that government would offer to the management. Here managers will work as agents and will try to serve the interest of the principals i.e. the shareholders or who supplies the capital. In a competitive environment, the managers will automatically serve the interest of customers by providing the railway service at minimum cost to meet the demand of the consumers. Now, whether this system would be successful will depend upon the size of shareholding by the private investors and the extent of managerial autonomy the system would provide. As the government of India has adopted the policy of restructuring a number of public sector corporations by inviting private investors to buy up to 20 per

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cent of the corporations' share capital, that model can also be applied in the case of IR by allowing 20 per cent of the share capital of the corporation to be bought by the private investors and by gradually raising it up to 49 per cent (Dalvi, 1995).

Governments' Latest Policy

Private investment in catering and other services associated with railways have already been started. On 7th January 2020, the Ministry of Railways and National Institution for Transforming India NITI AAYOG, Government of India has proposed a draft (http://www.indianrailways.gov.in/railwayboard) for inviting private investment for passenger services in some selected routes in non-suburban Railways. The draft says:

- Ministry of Railways, Government of India, the uthority s engaged in the development of railways. It covers about 68,000 route ilometres of the railway network. In the year 2018-19, the reserved passenger constituted 16% (0.59 billion) of the total originating non-suburban passengers (3.65 billion).
- The introduction of ext-generation technology is needed for the provision of higher service quality, reduction of journey time. Considering this requirement, the authority has decided to allow private operation in passenger trains.
- These train services would be operated on the common track of the Indian Railway Network where at present both passenger and freight trains are operated. However, at certain routes, additional tracks would be available.
- The authority would select the private entities for undertaking the project through a two-stage competitive bidding process comprising of Request for Qualification (RFQ) and Request for Proposal (RFP). The bidders would be shortlisted based on their technial and financial capacity through the process of RFQ. The shortlisted bidders then would offer a fixed price bid at the RFP stage for undertaking the project.
- Operational routes: n indicative list of 100 rigin-destination pairs for the introduction of train services by the private entities have been made by the authority in which a total of 100 rakes have been divided into a number of clusters such that each cluster would require the operation of at least twelve rakes.
- Duration of journey on each Path: A train should complete a path within a time similar to that taken by the fastest train of IR operating on that path, with a variation of plus or minus ten percent. IR would be n o n -

discriminating for the trains operated by the Concessionair (shareholders).

- Length of Train: ach train shall have at least 16 coaches and the maximum number of coaches will not be more than the longest passenger train operating on the respective path.
- Configuration of trains: he configuration of each train as well as its coaches, shall be determined by the Concessionaire (private owner) based on the demand.
- Operation and Maintenance: he private entity must be responsible f o r the operation of maintenance. he standards, given by The Research Design and Standard Operation (RDSO) must be maintained with respect to operation and maintenance. IR will only provide berth or space to a private entity in the existing maintenance depots or washing lines or a space i the adjacent area for up-gradation and use of the same by the Concessionaire. The private entity must arrange its manpower, tools and plants as required for undertaking the maintenance obligations. Each train should be sent for maintenance in an interval of not less than 31 days or ravel of 40000 kilo metres IR shall also provide stabling lines for placing trains when idle. Further, the trains in a cluster may have to be maintained in more than one maintenance depot.
- Safety Certification: R will provide a safety certificate to the private entity based on safety parameters indicated by IR and travel worthiness certified by the Concessionaire however, the same will not relieve or absolve the Concessionaires of the obligation and liabilities as specified in the Agreement. Detailed terms and conditions will be specified in the Concession Agreement.
- Concession Period: he concession Period will be for a period of 35 years commencing from the Appointed Date.
- Maximum Permissible Speed: he maximum speed for the passenger trains to be operated by the private entity must not exceed 160kmph.
- Determination of Fare: The private entity will enjoy full freedom to determine the fare, without any intervention from IR.
- Design of the Rolling Stock: private Entity can procure trains and locomotives from a source of its choice if such trains and locomotives are compatible with specifications and standards specified in the Concession Agreement. The trains could be either loco-hauledor distributed power.
- Validation of Rolling Stock: accredited Independent Safety Assessor (ISA) will be responsible for validation hile introduction of new rolling stock.
- Role of Private Entity: inancing, procuring, operation and maintenance of the trains will be the responsibilities of the private entity. They will pay to

IR pre-determined charges for haulage and any other payments as specified in the Agreement.

- Penalties for non-performance Pre-specified penalties shall be recovered from the Concessionaire if they fail to meet the prescribed performance standards and outcomes. Similarly, IR will also be penalized ta re-specifiedrate for the failure on the part of the Railways.

Conclusion

The results of the privatization of Indian Railways are uncertain. Privately designed fare structure will set fare such that it is equalized with the marginal cost. This equilibrium condition will further lead to a level of optimum production which is much less than the requirement of the economy. The process of cross-subsidization will not continue, A much higher passenger fare will lead to a fall in demand for railway service especially in the case of suburban railways. But, in our country, a huge number of people depend on suburban railways for their daily earnings. Now, whether Railways will manage to earn more profit due to a rise in fare which will depend on the elasticity of demand for railways. With a much higher elasticity of demand, the railway will not be successful to create much surplus available for further development of itself. But only with a lower elasticity, higher profit will be realized. Moreover, one of the most important modes of communication within the country will be underproduced. This may impact adversely the overall economic activity of India. There are many such routes where only one or two pairs of trains run daily which fails to generate enough revenue to cover the fixed costs of maintaining the route. Private ownership of railways will lead to the discontinuation of such routes. This may cause a severe attack on the communication of those regions. Furthermore, IR is one of the largest employers in India. In 2019-20, the total number of staff on Government railways and metropolitan transport projects (railways) was 1253643(Statement 40(I), Indian railways Annual Statistical Statements 2019-20). Private ownership will result in less recruitment in order to cut the fixed costs. This will worsen the employment scenario of the country which will, in turn, affect the aggregate demand negatively.

As seen from the data and from reports of the railway committee, IR is not very successful to generate a surplus in its revenue over cost consistently. The major reason behind this is that IR does not operate as a profit-making institution only. It has some social obligations as well. To keep those obligations IR, like other transport modes in India, adopts the method of cross-subsidization, as mentioned earlier. The surplus generated from freight transport cannot be used in making new investments. Rather it is used for the operation of passenger services. Although a huge number of people travel daily through trains, the revenue generated from passenger

service is very low as the fare has to be kept sufficiently low because the majority of railway's consumers fall in the lower-middle or lower income group. As a result, IR lacks adequate funds for further investment which actually slows down the process of growth. The number of passengers has constantly been increased over time which indicates that the demand for passenger railways service is growing but IR fails to reap the benefit of this increased demand as it is not able to raise the fare. Only the fares of higher class passenger services like AC two-tier or three-tier of non-suburban section i.e. the long-distance mail or express trains have been increased but that revenue is also used as a subsidy for other passenger services to keep the fares of sleeper classes of non-suburban service and most importantly the fares of suburban services like local trains at a very low level.

Since the decade of 1980s, attempts have been made to find a new way of policies that can make a reform in Indian Railways so that the burden of such worse performances can be done away with. After the Economic reform in the Indian economy starting in the early 1990s, the need for such reform within the railways has gone further. With changing socio-economic environment, interdependence and interrelations among different countries of the globe on various economic and political matters, the priorities of the governments have changed. Most of the economies in the present world of globalization are not in a position to continue with such huge burdens of losses of public sector enterprises in the name of social responsibilities, India not being an exception. For these reasons during the last couple of decades Government of India is trying to take reformative policies with respect to Indian Railways. But given the constraints, mentioned earlier as social responsibilities, responsibilities of providing cheap transport facilities to the population of the country, and due to other problems like the development of roadways for internal freight carriage and development of airways for passengers of higher-income groups, the reforms measures have ended with a failure. Continuous financial pressure has raised the question of the privatization of IR. The Government of India in the year 2017 merged the railway budget with the union budget which have been a separate budget prepared under the ministry of railways since 1924. This policy might have been taken with the thought of gradual privatization of Indian Railways.

Privatization of railways will definitely turn it into a financially well-performing enterprise but the profit-making motive of the private company will not allow the method of cross-subsidization. The price will be charged depending upon the marginal cost of operation. If the privatization leads to monopolization, then the equilibrium quantity of railway services will be decided with a view of equalizing marginal revenue with the marginal cost, and the price will be charged much higher than now. As a result, the huge demand for railway transport will not be met which will impact adversely the livelihood of a large section of people. Furthermore, the

underproduction and increased fare of railway services especially of suburban railways will eventually create additional pressure on alternative modes of transport especially buses. That may raise the demand for and as a result supply of road transport which can create additional employment in the said sector but it will cause huge congestion and may cause an increase in the number of accidents especially in the urban area.

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Application Of ICT For The Library Services And Smart Librarianship

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Abstracts: The progress in the Information and communication Technologies (ICT) enable academic users can be connected by several technical options in a more affordable manner. Based on the widely accepted conceptualization of "ICT for development", this article suggested various ways where convergence technologies can be used to improve and promote the existing library services. Rapidly developing ICT are creating new opportunities and challenges for traditional librarianship, it changes the library into digital and virtual with global approach. ICT has become the first need for the smart librarianship. Change is the only constant and should be accepted by the librarians so as to provide quality services, round the clock to endless users by breaking the boundaries of libraries.

Keywords: ICT, automation, networking, information services, librarianship

1. Introduction

The new technology which today is available is just a new tool to produce, store and distributed information. It also makes the communication more effective and rapid. That is why we call it now a days ICT, Information and Communication Technology and not only IT (Information Technology). As means of communication this new technology is comparable with the book. We all know that ICT has already changed the way libraries functions. Today ICT is the vital component of information access, information dissemination and information communication across the globe. For the libraries, ICT is extremely changing the management of resources, housekeeping operations as well as the way services are delivered. ICT has empowered users to avail many services without any human involvements. Today librarians have to accept the challenge of change and to serve as an information professional of the fast changing Hi-Tech society.

2. Informat-ion & Communication Technology

Information and Communication Technology(ICT) is often used as an extended synonym for information technology (IT), but is a more specific term that stresses the role of unified communication and the integration of telecommunications (telephone lines and wireless signals), computers as

well as necessary software middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information. ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form. For example: personal computers, digital television, E-mail, robots. So, ICT is concerned with the storage, retrieval, manipulation, transmission or receipt of digital data. . ICT has affected all spheres of life and also the library.

3. ICT in Libraries

Now a days there are several information communication technologies for various housekeeping, management and administrative functions of the library, different electronic and digital media, computer aided electronic equipments, networks and internet has provided significant role in retrieval and dissemination of information and playing a vital role for upgrading of libraries main of them are:

3.1. _Automation_: Automation is the concept of reducing the human involvement in all the library services so that, user can get the desired information with the minimum efforts. Main areas of the automation can be classified into two-organization of all library i.e. databases and all housekeeping operations of the library.

3.2. _Networking_: Networking means a group of Libraries and Information Centers are interconnected for common pattern for information exchange and communication to improve the efficiency

3.3 _Management_: Management includes the activities like Classification, Cataloging, Indexing, Database creation, Database Indexing, which will positively be geared up by the use of these fast ICT developments.

4. ICT based Users services:

Now a day most of the library users are adopting electronic habits, making increasing use of the new ICT, including computers, the Internet, the Web, Intranet, Extranet and other technologies. They require access to the latest information, updated information resources and access to ICT facilities that they could use in their work. Use of ICT in libraries improves user satisfaction. Because of the use of ICT lots of benefits are for the users.

- Remote access of information.
- Greater and easier retrieval of information
- Information available to anyone, anytime, anywhere, and at users' desktop.
- Easy to capture, store, manipulate and distribute information.
- Information creation on digital format
- Information communication through e-mail.

well as necessary software middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information. ICT covers any product that will store, retrieve, manipulate, transmit or receive information electronically in a digital form. For example: personal computers, digital television, E-mail, robots. So, ICT is concerned with the storage, retrieval, manipulation, transmission or receipt of digital data.

- Removal of all the barriers of communication, distance and time.
- Online access and file transfer through Internet.
- Enclosures sharing of information.
- Quicker efficient and effective library services to a wide range of users
- Optimum utilization and sharing of resources among institution in cost effective manner.
- Simple and prominent collection development through web.
- The available information can be provided through the homepage.
- Online book shopping and publisher's website help in quality collection development and are time, money and labour saving.
- Online orders through the Internet, downloading from website avoids postal delay.
- Reminders may be sent through e-mails.

5. ICT and Librarians

The computer and information technology has brought in a new impact to the library services and information usage. In libraries, information technology has assisted LIS professionals to provide value added services and give more remote access to available information resources. Information technologies provide faster retrieval of stored information and reform our traditional library to a modern information center. Recent ICT is impacting on various facets of libraries and the information profession. Advancements in ICT and the widespread use of ICT is resulting in digital information sources and digital media replacing and becoming the dominant form of information storage and retrieval. ICT also survives and makes true rules of Library Science 'Every reader his/her book/information', 'Save the time of the reader', 'Library is a growing organism'. ICT with its great information sources, fast transmission speed and easy access guarantees the satisfaction of the user with multifaceted demand, overcome the distance barrier and reduced the time required and guarantee the right information to the right reader at the right time. It also rises and resolves the library's demand of collection development. It is really an outstanding tool for the Library information centers.

6. ICT Empowers Library

- * To capture, store, manipulate and distribute information.
- To introduce and provide-new services, revitalize the existing services by providing faster access to the resources, by
- Overcoming the space and time barriers.
- * To provide need-based (tailor made), browsing and retrospective search

services to the users

- To utilize the staff for providing better information services.
- To develop/upgrade the abilities of professionals;
- To encourage networking and resource sharing at the local level.
- To digitize the documents-for preservation and for space saving.
- To support library housekeeping operations.
- To access library catalogue, databases of other libraries through library networks.
- To improve the efficiency of library functions; and improve the cost effectiveness of library operations.

Thus the adoption of ICT should not be considered as a luxury, but as an added tool to provide the information, services, effectively to fulfill the complex needs of the users.

8. ICT Used in Libraries

* Computers
- Internet
- Library Housekeeping software
- Consortia
- CCTV
- RFID
- Institutional Repository
- Web design
- E-resources

10. Conclusion

The library today, is a technologically driven one that uses the principles of traditional library services to organize knowledge and communicate same to clients in the global community essentially by electronic means. ICT has fulfilled its promise in academic libraries, there is a remarkable rise in the use of ICT, and many of the library activities are now ICT driven. This has led to the speed of acquisition, processing, storage, retrieval and dissemination operations. ICT has also helped to curb the problem of information explosion in this information era. Outdated technologies that were first acquired are merely guarding our libraries, thereby creating systemic complexities that are increasingly becoming difficult to sustain. It should be noted that technological changes take place very often and there is a clear need to keep abreast of the changes when they occur without losing out on quality. However, this process is either not well established or if established it is riot enforced, hence and its introduction and application will improve the quality of service to users. This would enable the integration of a range of ICT's in the enhancement of activities into the

library operation with a range of multimedia resources, as well as through a web environment.

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Community Information Services and College Library

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Abstract :

Community Information Services(CIS) is emerging as a facet of Public Library System in the developing countries. Colleges are now working for the betterment of the community people by adapting one or two villages. A college library may stretch out its services outside the campus. Many facets of CIS may be implemented through college library. College libraries are now extending their services to the local people. This article would like to explore the extents for providing CIS from College Library.

Keywords : *Community Information System, Public Library, Community Library and Information Centre(CLIC)*

1. Introduction : We know that necessity is the mother of invention. People need information for fulfilling their aim and objective. Whenever a community seeks information, the librarian or the information manager is the right person to take the opportunity to provide the right information to the person at the right time in the right manner. Library professionals believe that an individual's needs are not always common and personal ways of providing information strengthen the relationship among the receiver or consumer and provider of information. Library is the best to provide Community Information Services(CIS) to the community where it works. College libraries could also play a vital role in this regard, where a big number of young people come from the local community to get their needed information. If the college authority provides sufficient expertise and infrastructure for providing community information services, the college library gets momentum in this regard. Nowadays college librarians are tech-savvy, accustomed with ICT and they possess an efficient knowledge base for providing information and documentation services to their users via offline and online mode of communication. We need to take initiatives so that community people could access the resources and services from the college library for their all-round development. There should not be any misconceptions about the role of college libraries.

2. Community : Community is a cross-section of the society which has some common features. It is geographically different from other communities or there may be some other sign of differences from the

problems in our modern society in respect of the definition of community. We may quote - "The term community connotes warmth and comfort. It offers a space for relaxation and safety from a world riven with conflict, danger and uncertainty. Globalization world has seen the 'melting down' of many traditional communities, and even society because of the difficulty of drawing boundaries between community 'insiders' and 'outsiders', and sustaining them." (Ref. epgpathshala, Subject : Social Work Education, Module 2: Community and Identity,)

3. Community Information : Community information is the information that people need or want in order to live their everyday lives. It enables individuals and groups to make informed decisions about themselves and the communities in which they live.(Raven, 2003)

Community information service (CIS) is not an entirely new phenomenon. It is also not a service that is entirely in the realm of libraries. Since the dawn of human civilization and formation of larger societies, human beings have been faced with community information (CI) needs and such information flowed to the needy through various channels, unmediated by librarians through informal networks. (as cited in Chatterjee, 2017)

3.1 Of the community : We may call it the knowledge base of the community. It may be well recorded or not but depending upon this information, the knowledge of the community is standing in its roots and functioning in the present and is going ahead in future. It is generated from the community about the community.

3.2 For the community: Information is beneficial for the community people. Here needed information may come out from that very particular community or from outside. But in true sense, this information is essential for the community.

3.3 By the community: Information which is derived and transferred from and among the community people by their activities. This information may be procured and organized by a library and information professional. A college library may take initiative in this regard.

Position of CI in Community as stated by Pettigrew & Wilkinson(1996)(as cited in Mukhopadhyay, 2011) restricted the idea of community information by three borderlines as follows-

- All data (about a community) that have been made to flow
- All original data that have been made to flow from within the

community

- All data that is flowing anywhere that is useful to a Community.

4. What is CIS: We may say in simple words that information services which target the community people is community information services. Community people have various types of information needs. Library or Information System or Community Library and Information Centres facilitate services depend upon the need of the community. Community Information Services were defined by a group appointed by the Library Association (1980)(Now CILIP) as: "Services which assist individuals and groups with daily problem–solving and with participation in the democratic process. The services concentrate on the needs of those who do not have ready access to other sources of assistance and on the most important problems that people have to face, problems to do with their homes, their jobs, and their rights."(The Library Association, 1980). Many other delimitations we have in this regard - " A positive decision support system which concentrates on enabling people, particularly those in lower socio-economic groups, to act either individually or collectively on their problems in the fields of housing, employment, family, personal matters, consumer affairs, household finance, education, welfare rights, and civil rights."(The Library Association, 1980).

5. Advantages of CIS : CIS have many advantages. P.S. Mukherjee **finds the advantages as follows -** i) Expanded social interaction, ii) Decreased transaction cost, iii) Employment and educational gains, iv) Increased information exchange, v) Greater skill and confidence building, vi) Increased knowledge of community, vii) Increased access to quality information, viii)Ability to identify/share trusted information.

6. Public Library, Community Library and Information Centre(CLIC) and CIS : Public library is people's university. Its roots are concerned with the common people's interest. Originally CIS is derived from public library system. Many public libraries and CLICs of developed countries are providing CIS to their communities effectively. They have the required infrastructure.

7. Librarians are working as communication managers and information managers in information society : Librarians, from the very beginning of the structured library system, have been working as intermediaries or communication managers. They create a relationship with a book and its users. In the Information Society, their role is not changed but the mode of providing services is changing with the necessity of the era. They may be called now as Information Manager. They interact with their users in many ways – directly or indirectly. Their mode of

communication may be divided into internal communication, external communication, verbal or oral communication, non-verbal communication, etc. All these modes of communications are now being applied in case of community information services.

8. College and Community : As we found in "Fostering Social Responsibility and Community Engagement in Higher Education Institutions in India"(National Curriculum Framework and Guidelines) under UGC(2019), Unnat Bharat Abhiyaan(UBA) 2.0(2018) was launched by the Minister of HRD. UBA 2.0 aims to bring a transformative change in the development of rural areas by active involvement of higher educational institutes with rural communities. It also aims to reorient the communities through research and development. Emphasis is to be given in undertaking research projects in partnership with the local community through community-based research methods. Centre for Indigenous Knowledge in Agriculture(at Gandhigram Rural University), was established to document, analyze, validate, standardize and further propagate the indigenous knowledge/practices in Agriculture and allied fields in Tamil Nadu. And many other institutes are working with the community people. A college may take initiative depending upon its infrastructure, fund and expertise to do the betterment of the community to which it belongs. Community information services are to be very common to make a bonding with the community. And we think it is the right time to take initiatives to make it a successful one. A college may adopt one or more villages for their development. CIS will obviously help the people to be informed citizen. That is our destination.

9. College Library : College library comes under academic library. This serves only the students, faculty and other staff members of the institution. Besides the day to day services, the college library extends its services to the neighboring people, former students, former faculty and former staff members.

9.1 Provides Extension Service : Extension service is one type of service which is given for the promotion of the institution as well as strengthening the relation among the people where the institution belongs.

9.2 Initiative to provide CIS : College libraries have resources and efficient librarians. We need to build infrastructure for providing CIS. Involvement of the college authority, LIS professionals and community people is highly essential for starting and continuing the service towards community people. We know a huge number of community people will feel hesitation as they are not equipped with these services. At the very beginning awareness campaigning is also required. Librarian here plays the

role of liaison officer. A big amount of capital is not required here. It may start with a potential. Community people need information, when they could access their information with ease from the college they would get satisfaction. Depending upon the needs of the users services should be provided pin-pointedly, exhaustively and expeditiously.

- A college library needs some essential equipment like a computer with internet connectivity, printer, scanner, camera, mobile hand set, recorder and digital library software etc.
- Negotiation with the community people to understand their basic information needs and prepare the database.
- Procurement of explicit knowledge and implicit knowledge Tacit knowledge) originated from the community.
- Arranging training of the selected persons from the community, who will play a vital role in between the community people and the institution.
- Librarian should possess the quality –)Confidence, ii)Competence, iii) Competence, iv) Patience, v) Sympathy and i) ability to learn the needs of the users Routh, 2017) to provide best quality services to the Community. College students are doing their project papers on very specific topics related to the communities. Librarians are helping them with full enthusiasm. College authority may involve these students as and when required for CIS. It will give them financial support also. Project with a holistic approach may be taken which will fulfill the needs of the community as well as the college library. College faculty of different disciplines may also be involved to explore different corners for procuring knowledge from the community and formulate a structure which will be more beneficial for the people. Information management process will get accelerated. Faculty members become proud of being a part of CIS form the college library.

10. Areas of CIS: Community information services target every aspect of the community people. We may focus on the area of information service as follows -

10.1 Livelihood & Health : Agriculture, Animal Husbandry, Handicrafts, Caste-based job, family-business, health and hygiene, house etc.

10.2 Education : From the very beginning, i.e. primary to higher studies, for educational opportunity, resources etc.

10.3 Social : Fulfilling social needs. Ensuring social wellbeing.

10.4 Environment : Awareness generation on environment to protect it and

their livelihood, to ensure sustainable development of the community.

10.5 Civil Right or Democratic Right and empowerment: Protect civil rights and democratic rights. To equip the community people with equity and justice.

10.6 Geographic Information : Awareness generation on geographic information, local resources like water, forest, fuel etc. Village map with details.

10.7 Culture: Different aspects of culture like habits, behavior, belief, arts, attitude, thought and activity, sciences, mode of perceptions related information.

10.8 Training for Employment: Provides information expeditiously to the community people who seek employment and training.

10.9 Sharing of Knowledge and Recording of Knowledge : Explicit knowledge of the community should be organized through different types of document form. It will help the community within and outside the community.

10.10 Tacit Knowledge and its documentation : Capturing tacit knowledge is a difficult job. In true sense capturing the entire tacit knowledge of a community is quite impossible. Though there should be some initiatives to record and organize the implicit knowledge or tacit knowledge for posterity. A man is doing his work with perfection but he cannot explain how to do the job due to his lack of expression skills, language barrier etc. It is "action oriented" or "practical intelligence" knowledge. Online collaboration may help to transfer this knowledge to the society, show your practical procedure, discussion, conversation and story from life. Factual knowledge is not working everywhere.

10.11 Oral Tradition and Oral History: These are valuable for a community, society and world also. CIS also give emphasis on these.

10.12 Disaster : A community should be protected from disasters, whether it may be human-activity related or natural. CIS should take care on this issue. It will help to a) Prevent the danger or threat of any disaster, b) Mitigate or reduce the risk of any disaster or its severity or consequences. If CIS is become a successful one it obviously minimize the effects of disaster. In broad sense all information that may be provided to the community people may be categorized as -
Survival information - such as related to health, housing, income, legal

protection, economic opportunities, political rights, civil rights etc. **Citizen action information** needed for effective participation as individuals or as group members in social, political, legal, and economic processes.

Local information like educational facilities, health information, local agencies, etc. (Bandyopadhyay, 2012).

11. Role of College Librarian :
Librarian's role is very pertinent here. Without him CIS form a college library is quiet impossible. He/she would be the soul architect for the whole programme. Now college librarians are very much accustomed with ICT enabled resources generation, organization and dissemination with a keen interest in printed resources. We may expect variety qualities in them for proper decision making and execution of the whole programme. Librarians should keep in touch with the expertise from the community for running the whole service into the right direction. And modification of services should be made after getting feedback and judging the satisfaction of the community users or we may say beneficiaries of the services. Social channels should be given importance. Access time and other formalities would also be defined following simplest procedures. College Librarians are engaged in their day to day work within the library. For CIS they have to frame the whole programme including i)selection, ii)procurement, iii)accessioning, iv)classifying, v)cataloguing of information which will be served to the community and vi)creating of database will obviously help the professionals for easy access and retrieval of information at the time of need. Documenting tacit knowledge in the form of audio, video and image is to be done with keen interest. Earlier we have listed some qualities for the same. Here we also like to mention some, besides the earlier.

11.1 Public Relation: Possession of a good public relations skill is required. Ability to percept the language of the local people with an ease. We believe that Every individual has his own unique language. Librarian should Know whom he is speaking to. Know your users first.

11.2 Efficiency in ICT is desirable.

11.3 Motivation: Motivational skill is essential.

11.4 Equipment for information organization and dissemination must be well known to him or her.

11.5 Mode : Different modes and channels of communication must be in his or her grip.

11.6 Digital Divide : We have a digital divide in our society. Librarians with

the assistance of the higher authority should act accordingly so that the impact of digital divide could be lessened from the community. And the best quality of services could be achieved.

12. Limitations and Remedies : CIS is a part of Community Development. Public library is the best to provide these types of services. Besides this College Library could it as a challenge. There are many bottlenecks or limitations. These should be kept in mind before starting CIS from College Library.

12.1 Expertise: College library having only one professional must faces lack of expertise to implement. Two or more LIS professionals are required.

12.2 Time : College Library should invest more time beside college hours for ease of the community people.

12.3 Fund : College Library don't have so much fund to implement this in a while. There should be specific grant for providing CIS from college library by concerned authority.

12.4 Illiteracy and shyness : Community people not always literate. There may have many or some illiterate people. College is a place of higher education. Sometimes community people may have shyness in them or in their behavior. This illiteracy and shyness must be eradicated through different programme by government or NGOs.

We believe path creates more paths. Constant efforts with fund and expertise can change the paradigm of CIS. Before changing something we need to change ourselves.

13. Conclusion: College libraries have expertise. If proper planning for building infrastructure could be ensured, then community information services would be delivered from a college library to its community. Education is the key factor of development. "Learn with me" like programme would be more fruitful if CIS are given from the college library. Involvement of the authority and allocation of funds can change the paradigm of community information services. College libraries are extending their services to the local people and in the future it will serve the entire community. LIS professionals believe in it. And ultimately in near future it will fulfill the desire of the national regularity and assessment body like UGC and NAAC about full involvement of higher educational institutes with its community.

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Isolation, Purification And Study Of Antibacterial And Antifungal (Antimicrobial) Activity Of The Crude Extract From The Marine Cyanobacteria.

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Abstract :

This project study was aimed at the isolation, purification and study of antibacterial and antifungal (antimicrobial) activity of the crude extract from the marine cyanobacteria. A methanolic extract of the cyanobacteria was bioassayed with E coli1, B.subtilis, P.aeruginosa, S.aurius, Rhodococcus sp. as the target organism. Antifungal activity is also assayed by using C.albicans, S.cerevisiae and A.plumosum as target.

Introduction :
Marine Microbial Research And It's Importance:

The world ocean with a coastline of 312,000 km (193,000 miles) and a volume of 137,106 km3, is the largest ecosystem on earth, and has been used for a variety of purposes by man for millennia. Because of its large volume and vast area, influence of the world ocean on world climate is profound. Microorganisms occur nearly everywhere in nature and occupy an important place in human view of life. Marine microbes represent a potential source for commercially important bioactive compounds and their bioremediation capabilities are also remarkable. They also play a crucial role in decomposition of organic matter and cycling of nutrients. Microbes also serve as food for some bottom-living organisms. Our knowledge of marine microbial diversity has, however, been severely limited by relying on microorganisms that have been cultured.

India has rich biological diversity with only 2.5% of land area, India accounts for 7.8% of the recorded species at global level. In terms of marine environment, India has a coast line of about 8000 km and exclusive economic zone of 2.02 m sq km .Study of marine fauna in India has drawn

greater attention from the 18th century onwards. In India major studies have been conducted only on the commercially important organisms such as crustaceans, molluscs, holothurians and higher vertebrates. Now research relate to microorganism have been started.

Marine microorganisms which are salt-tolerant, provide an interesting alternative for therapeutic purposes. Marine microorganisms have a diverse range of enzymatic activity and are capable of catalysing various biochemical reactions with novel enzymes. Especially, halophilic microorganisms possess many hydrolytic enzymes and are capable of functioning under conditions that lead to precipitation of denaturation of most proteins. Further, it is believed that sea water, which is saline in nature and chemically closer to the human blood plasma, could provide microbial products, in particular the enzymes, that could be safer having no or less toxicity or side effects when used for therapeutic applications to humans.

Ocean organisms are enormous scientific interest for two reasons. First, they constitutes a major share of earth's resources. Secondly, marine organism often possess unique structures, metabolic pathway, reproductive system, sensory and defense mechanisms because they have adopted to extreme environment ranging from the cold polar sea at -2 C to the great pressure of ocean floor, where hydrothermal fluids spew forth.

Development of potential drug from the ocean

Serious attempts to tap the vast potential of marine organisms as sources of bioactive metabolites that may be directly utilized as drugs or serve as lead structures for drug development started in the late 1960s. The discovery of sizeable quantities of prostaglandins, which had just been discovered as important mediators involved in inflammatory diseases, fever and pain, in the gorgonian Plexaura homomalla by Weinheimer and Spraggins in 1969 is usually considered as the "take-off point" of any serious search for "drugs from the sea" (Weinheimer and Spraggins 1969)

However, that unusual nucleosides which had been isolated from marine sponges already in the 1950s served as lead structures for the development of nowadays commercially important anti-viral drugs such as ara-A and the anticancer drug for leukemia, ara-C). The first document on antibiotic-producing marine bacteria was by Rosenfeld and Zobell. From 1969–1999 approximately 300 patents on bioactive marine natural products were issued.

Achievement made so far

The oceans are the source of a large group of structurally unique natural products that are mainly accumulated in invertebrates such as sponges, tunicates, bryozoans, and molluscs. Several of these compounds show pronounced pharmacological activities and are interesting candidates for new drugs primarily in the area of cancer treatment. Other compounds are currently being developed as an analgesic (ziconotide from the mollusc Conus magus) or to treat inflammation. Numerous natural products from marine invertebrates show striking structural similarities to known metabolites of microbial origin, suggesting that microorganisms (bacteria, microalgae) are at least involved in their biosynthesis or are in fact the true sources of these respective metabolites. This assumption is corroborated by several studies on natural products from sponges that proved these compounds to be localized in symbiotic bacteria or cyanobacteria. Recently, molecular methods have successfully been applied to study the microbial diversity in marine sponges and to gain evidence for an involvement of bacteria in the biosynthesis of the bryostatins in the bryozoan Bugula neritina.

Collection of wide range of marine organisms even from deep sea and islands is done and they are screened for 16 different bio-activities - (i) Anti-cancer; (ii) Immunomodulatory; (iii) Anti-hyperglycemic; (iv) Wound healing; (v) Anti-fungal; (vi) anti-protozoal; (vii) Antibacterial; (viii) Anti-inflammatory; (ix) Anti-viral; (x) Anti-hyperglycemic; (xi) Anti-hyperlipidemic; (xii) Spasmolytic; (xiii) CNS; (xiv) Pesticidal and Anti-allergic). Now the worldwide markets for Marine Biotechnology in Millions of US$. The table shows some important compounds isolate from marine species -

SOURCE	COMPOUNDS	DISEASE AREA	PHASE OF CLINICAL TRIALS	REFERENCES
Conus magnus (cone snail)	Ziconotide	Pain	III	Osenbach and Harvey (2001)
Ecteinascidia turbinata (tunicate)	Ecteinascidin 743	Cancer	II/III	Delaloge et al. (2001; Villalona-Calero et al.2002)
Dolabella auricularia (sea hare)	Dolastatin 10	Cancer	II	Vaishampayan et al. (2000)
Dolabella auricularia (sea hare)	LU103793a	Cancer	II	Smyth et al. (2001)
Bugula neritina (bryozoan)	Bryostatin 1	Cancer	II	Varterasian et al. (2001; Blackhall et al. 2001)
Trididemnum solidum (tunicate)	Didemnin B	Cancer	II	Mittelman et al. (1999)
Squalus acanthias (shark)	Squalamine lactate	Cancer	II	Bhargava et al. (2001)
Aplidium albicans (tunicate)	Aplidine	Cancer	I/II	Gomez et al. (2001)
Agelas mauritianus (sponge)	KRN7000b	Cancer	I	Kikuchi et al. (2001)
Petrosia contignata (sponge)	IPL 576,092c	Inflammation/asthma	I	Coulson and O'Donnell (2000)
Pseudopterogorgia elisabethae (soft coral)	Methopterosin	Inflammation/wound	I	Mayer et al. (1998)
Luffariella variabilis (sponge)	Manoalide	Inflammation/psoriasis	I	De Rosa et al. (1998)
Amphiporus lactifloreus (marine worm)	GTS-21	Alzheimer/schizophrenia	I	Kem (2000)

SUNDARBAN (THE SAMPLE COLLECTION SITE):

The Sundarban is the largest single block of tidal halophyticmangrove forest in the world. It lies at the mouth of the Ganges and is spread across areas of Bangladesh and West Bengal, India, forming the seaward fringe of the delta. The forest covers 10,000 sqkm of which about 6,000 are in Bangladesh.

The Sundarbans flora is characterized by the abundance of Heritiera fomes, Excoecaria agallocha, Ceriops decandra and Sonneratia apetala. A total 245 genera and 334 plant species were recorded by Prain in 1903.

The Sundarbans is very rich in wildlife. The Sundarbans are home to approximately 500 Bengal Tigers as of 2004, one of the largest single populations of tigers. At least 120 species of commercially important fishes, 270 species of birds, 42 species of mammals, 35 reptiles and eight amphibian species.

Potential applications in biotechnology

Cyanobacteria are one of the potential organisms, which are useful to mankind in various ways. Cyanobacteria constitute a vast potential resource in varied applications such as mariculture, food, feed, fuel, fertilizer, medicine, industry and in combating pollution.

Food and feed

➤ Spirulina is used as food supplement because of its excellent nutrient composition and digestibility. It has high protein content (60–70%), 20% carbohydrate, 5% lipids, 7% minerals and 6% moisture.

➤ It is also a rich source of beta-carotene, thiamine and riboflavin and is one of the richest sources of vitamin B12.

➤ A large number of marine nitrogen-fixing cyanobacteria have been tested for their nutritional value with the hybrid Tilapia fish fry; a majority were acceptable as single ingredient feeds. Very high growth rates of Tilapia fish using marine cyanobacteria with in-door and out-door cultures have been reported.

➤ In laboratory, the marine cyanobacterium Phormidium valderianum BDU 30501 was shown to serve as a complete aquaculture feed source, based on the nutritional qualities and non-toxic nature with animal model experiments.

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Fine chemicals

A variety of fine chemicals such as pigments, vitamins and enzymes with varied applications can be obtained on a commercially viable scale from cyanobacteria.

> A number of cyanobacteria are rich in vitamins and many can excrete them into the surrounding environment. Some marine cyanobacteria are potential source for large scale production of vitamins of commercial interest such as vitamins of the B-complex group and vitamin E.
> Feed grade Phormidium valderianum is an excellent source of phycocyanin, a blue natural colorant useful as a phycofluor in diagnostics.
> Cyanobacteria being photoautotrophs have the ability to photosynthetically transform simple, labelled compounds such as $14CO_2$, $13CO_2$, $33H_2O$, $15NO_3$ into complex
> organic compounds. Isotopically labelled cyanobacterial metabolites such as sugars, lipids and amino acids are commercially available.
> Cyanobacterial isolates with capacity to mineralize organic phosphorus have been reported with alkaline phosphotase activity. Enzymes such as chitinase, L-asparaginase, L-glutaminase,amylase, protease, lipase, cellulase, urease and superoxide dismutase have been reported from cyanobacteria.
> Shashireka et al.98 found that Phormidium valderianum BDU 30501 was able to tolerate and grow at a phenol concentration of 50 mg/l and removed 38 mg/l within a retention period of seven days. This result opens up the possibility of treating a variety of phenol containing

effluents. The organism was also effective in optimal sorption/desorption of heavy metal ions (Cd2–, Co2–).

Pharmaceuticals

Cyanobacteria in general and marine forms in particular are one of the richest sources of known and novel bioactive compounds including toxins with wide pharmaceuticalapplications.

➢ Gustafson et al.73 reported anti-HIV activity of marine cyanobacterial compounds from <u>Lyngbya lagerheimii</u> and <u>Phormidium tenue</u>.

➢ Oscillatoria laete-virians BDU 20801 shows anti-candida activity. An immunopotentiating compoundwith male anti-fertility, without being toxic to other systems in a mice model, was found in the extracts of Oscillatoria willei BDU 130511 .

➢ Medically important gammalinolenic acid (GLA) is relatively rich in cyanobacteria namely Spirulina platensis and Arthrospira sp. which is easily converted into arachidinoic acid in the human bodyand arachidinoic acid into prostaglandin E2 . Prostoglandin E2 has lowering action on blood pressure and the contracting function of smooth muscle and thusplays an important role in lipid metabolism.

➢ Cryptophycin first isolated from Nostoc sp.ATCC 53789 is a potent fungicide. It has been isolated from Nostoc sp. GSV 224 andhas exhibited potent cytotoxicity against human tumor cell lines. It shows good activity against a broad spectrum drug-sensitive and drug-resistant murine and human solid tumors.

➢ Lipopeptides are interesting and biochemically active, having cytotoxic, anticancer, antibiotic, enzyme inhibitor, antiviral and antifungal activities (Burja et al., 2001).

Research Works In The Field Of Cyanobacteria
Adaptation and Evolutionary Biology
Research in the Adaptation and Evolutionary Biology group focuses on several key environments and the diverse range of cyanobacteria and other organisms that inhabit them. These environments include the hypersaline Hamelin Pool, the McMurdo Ice Shelf (Antarctica), native Australian plants and endophytes from the Sydney and New South Wales region, cyanobacterial bloom formations from Moreton Bay (QLD) and agricultural soils (wheat fields in).

➢ Investigate the biodiversity of cyanobacteria in the coralloid roots of Australian cycad species. Currently characterising the 150 isolates at the 16S rDNA level as well as screening for potential toxin production by the endosymbionts is competed.

➢ Study of the influence of stress conditions on dinitrogen fixation by Polar cyanobacterial strains. Study of whether biological nitrogen fixation by cyanobacteria and the global nitrogen balance is affected by global warming.

➢ Characterising the genetic and physiological basis for tolerance to high salinity in a novel archaeon isolated from stromatolites.

Toxicology and Drug Discovery
The toxicology and drug discovery deals with small molecules and micro-pollutants and with their effects in eukaryotic and prokaryotic model systems. The aims of the study of the genetic basis and the toxicological effects of natural compounds from plants and microorganisms, alongside with natural toxins and anthropogenic pollutants. The group is focusing particularly on saxitoxin, anatoxin and cylindrospermopsin, studying the genes encoding these toxins' biosynthetic enzymes, their diversity and their distribution.

➢ Genetics of STX production in cyanobacteria and dinoflagellates and microbial diversity in extreme environments is under research.

➢ Screening strains of marine bacteria isolated from stromatolytes for the presence of Non-Ribosomal Peptide Synthetase (NRPS)and polyketide Synthetase(PKS)genes and to obtain the full sequence for the interesting or unique PKS and NRPS genes is going on.

Possible role of natural and antropogenic toxicants on the insurgence of neurodegenerative diseases. By adopting some novel approaches to the area it is hoped that the specific targets and biological mechanisms involved can be identified, explained and ultimately addressed for environmental risk assessment.

➤ Cyano Biotech currently develops a transporter for liver-specific agents. This detoxified compound will then be used for coupling to pharmacologically active substances to combat liver-specific diseases without effecting other organs.

MARERIAL & METHOD

Steps:
  ➤ Isolation of cyanobacteria

(1) Pour plate method
(2) Spread plate method
(3) Streak plate method

ISOLATION OF MARINE CYANOBACTERIA

Initial isolation of cyanobacteria from marine environment may give rise to mixed culture; therefore it is essential to purify the individual types of cyanobacteria from the mixture. This could be achieved easily by streak or spread or pour plate techniques. All these are essentially dilution technique of different types resulting the physical separation of individual cyanobacteria from mixture allowing them to form distinct colonies which can then be picked up to make pure culture. Three types of culture isolation techniques.

Procedure of Isolation of marine cyanobacteria

(1) Streak plate :-
Principle: -
It is a conventional method to produce isolated colonies. In a streak plate, from the loop containing cyanobacteria, varying numbers of cyanobacteria adhere to the surface of the media and towards the ends of the streak the

number gets so much reduced to form separate colonies which is our desire to produce.

Materials required:
  ✓ Petri dishes containing solidified ASN III agar media.
  ✓ Inoculation needle.
  ✓ Flame.
  ✓ Laminar.
  ✓ Cyanobacteria culture.

Procedure:–

Firstly agar plates containing ASN III media is produced. Then the inoculation needle is flame to sterilize and cooled it by jabbing it into the edge of the agar medium. With the drop on the edge away from the body, the culture is streaked back and fourth, edge to edge parallel lines, moving towards the body. When the needle reaches the centre of the plate, the plate is spined around 180 degrees and streaking is continued now moving away from the body.

(2)   Spread plate :-

Principle:

In spread plate the cyanobacteria in liquid medium are directly spread over the entire surface of the solid medium resulting in separation at many places.

Materials required:

  ✓ Petri dishes containing solidified ASN III agar media.
  ✓ Spreader.
  ✓ Flame.
  ✓ Laminar.
  ✓ Cyanobacterial culture.

Procedure –

1. First ASN III agar medium is prepared .

2. Then the medium, Petri dishes, tissue grinder are sterilize.

3. A small portion of cyanobacteria is grinned with the help of tissue homogenizer.

4. 1 ml of ground mixture is taken and serial dilutions is prepared.

5. The Petri dishes are leveled and the sterilized ASN III agar medium is pored in the petri dishes and allows them to solidify.

6. Then 0.1 ml of diluted cyanobacterial sample mixture is inoculated onto the surface of agar and spread it thoroughly with 'L' shaped glass rod or spreader.

(3) Pour plate: -

Principle –

In pour plate there is direct dilution of cyanobacteria. While being suspended in the pour agar resulting in separation in the time of plating. The additional solidifying substance to liquid media containing cyanobacterial cells traps the individual cells in place. In the agar medium instead of floating around when they multiply, as in the liquid medium they produce fixed colony of the cells or filaments and growth to form separate colonies.

Materials required:
✓ Petri dishes.
✓ Sterilized melted ASN III agar medium.
✓ Flame.
✓ Laminar.
✓ Cyanobacterial culture.
✓ Conical flasks for serial dilution.
✓ Test tube.

Procedure: -

a. A set of sterile 99.9 & 9ml water blanks in 250 ml conical flacks and 20 ml tubes is prepared respectively.

b. 100 mg cyanobacterial sample is added with 99.9ml water and the complex is shaken thoroughly. It is leveled as 10^{-1} dilution.

c. Transfer 1 ml from 10^{-1} dilution is added to a 9ml water blank and is mixed thoroughly. It is leveled as 10^{-2} dilution.

d. Transfer 0.1 ml of diluted suspension to a tube containing ASN III agar medium cooled to 47 degree Celsius.

e. The contents is mixed well and pour into sterile Petri dishes.

f. Preparation of 10^{-3}, 10^{-4}, 10^{-5} dilutions is done following similar procedure transferring 0.1 ml suspension from each dilution in separate molten agar medium to prepare pour plates from each dilution.

g. The contents are allowed to solidify.

2. Purification Of Marine Cyanobacteria (Triple Antibiotic Treatment)

In cyanobacterial culture many bacterial contaminations are present. It may be difficult to remove certain contaminants by repeated or ultrasonic treatment. In such instances use of a chemical method rather than a physical method is preferred. But by a physical method such as washing and ultrasonic treatment may followed by one such chemical method using antibiotic singly or in combination to kill the growth of tenaciously attached contaminants is the perfect one. So purification by an antibiotic treatment has been used widely.

Procedure:-

1. 100 mg of penicillin G and 50 mg of streptomycin sulfate together is dissolve in 10ml of distill water.

2. 10mg of chlorumphenical dissolved in 1ml 95% et-OH is added to the penicillin and streptomycin solution and it is mixed well.

3. 1ml of cyanobacterial suspensions to be purified is placed in each of six 125ml. Each flasks containing 50ml of culture medium.

4. One of the following volumes of antibiotic is added to each of the flasks - 0.125, 0.25, 0.5, 1, 2, 3 ml. This provides penicillin level ranging from approximately 20-500mg/l and corresponding levels to other antibiotics.

5. The culture flask is placed under suitable condition for growth.

6. After 24 & 48 hrs, some cyanobacterial cells are aseptically transfered from each flask to be used as sterile antibiotic free culture medium.

7. The cyanobacterial cells are washed with sterile water twice to make it free form antibiotics.

8. Culture tubes are checked for bacterial contamination after 2-3 days using nutrient agar plates.

Media Preparation :-

To isolate & maintain the marine cyanobacteria appropriate media are used and congenial environmental conditions are maintained. Phosphate, nitrate, magnesium, calcium are the macro nutrients generally required by them. The essential micronutrients are iron, zinc, manganese, copper & molybdenum.

Media recipe:

ASN-III

Components	Amount
NaCl	25.0 g
$MgSO_4 \cdot 7H_2O$	3.5 g
$MgCl_2 \cdot 6H_2O$	2.0 g
$NaNO_3$	0.75 g
$K_2HPO_4 \cdot 3H_2O$	0.75 g
$CaCl_2 \cdot 2H_2O$	0.5 g
KCl	0.5 g
$NaCO_3$	0.02 g
Citric acid	3.0 mg
Ferric ammonium citrate	3.0 mg
Mg EDTA	0.5 mg
Vitamin B_{12}	10.0 µg
A-5 trace minerals	1.0 ml
Distilled water to	1.0 L

pH 7.3±0.2 at room temperature

Trace metal mix A5:

Components	Amount
H_3BO_3	2.86 g
$MnCl_2 \cdot 4H_2O$	1.81 g
$ZnSO_4 \cdot 7H_2O$	0.222 g
$NaMoO_4 \cdot 2H_2O$	0.39 g
$CuSO_4 \cdot 5H_2O$	0.079 g
$Co(NO_3)_2 \cdot 6H_2O$	49.4 mg
Distilled water	1.0 L

Solid media preparation:

An easy and common way to prepare a solid media is to add solidifying agent to the liquid media. The most common solidifying agent is agar. Agar is a gelatinous substance derived from seaweed. Chemically, agar is a polymer made up of subunits of the sugar galactose.

The melting point of agar is 97 to 100 degree Celsius. But on cooling it solidified at about 42 degree Celsius. In this media we have use 1.5% agar by volume.

ANTIBACTERIAL ACTIVITY:

	E.coli 1	B.subtilis	P.aeruginosa	S.aureus	rhodococcus
Strain 1	+	-	+	-	-
Strain 2	-	+	-	++	+
Strain 3	-	-	-	-	-
Strain 4	+	-	-	-	+

The result of this char implies that the extracts have some antibacterial activity. Strain1 has activity against Ecoli1 and P aeruginosa. Strain 2 has activity against B.sultilis, S. aurius and rhodococcus. Strain 3 has no activity against any of this bacterias. Strain 4 has activity against E.coli 1 and rhodococcus.

Activity of strain 2 against S.aureus is the maximum one.

ANTIFUNGAL ACTIVITY:

	C.albicans	S.cerevisiae	A.plumosum
Strain 1	-	-	-
Strain 2	-	-	-
Strain 3	-	-	-
Strain 4	-	-	-

As the chart shows negative result against all the fungi so we can say this extracts of cyanobacteria have no antifungal activity

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