

## An Approach to Sustainable Development in the Case of a Small City : Behrampur, India.

Bijayanand MISRA

### I. Introduction

The Stockholm Conference on Human Environment brought in a new thinking which recognised the intricate interaction between environment and human welfare. Human welfare, however, depends upon economic development in the present context and future as well. The ecocentric approach of O' Riordan<sup>1)</sup> propagated that the development problem is not just the balance between the population and resources but the ends to which resources are put in pursuit of economic growth. This ecocentric approach got imbibed into the green movement world over, snowballing into the setting up of the United Nations Commission on Environment. The population-environment nexus and the overall welfare of the society conceived by Pigou<sup>2)</sup> may be useful in assessing the economic well being in the present context. But, its applicability to the future particularly in terms of resource pricing is still to be explored. Present style of development largely erodes the environmental resources meant for the future thereby diminishing the future human welfare. Recognising this, the World Commission on Environment and Development in its report "Our Common Future", concludes that "A new development path is required, one that sustains human progress not just in few places for a few years but for the entire planet into the distant future. Sustainable development, according to the Commission, is the development which "meets the needs of the present people without compromising the ability of future generation to meet their own needs".

The Rio Summit in its Agenda 21, one of the five official documents brought before the UNCED, devoted the entire two chapters on urban issues with special reference to urban environmental crisis. Chapter 6 of the Agenda 21 states that "Urban growth has outstripped society's capacity to meet human needs, enslaving hundreds of millions of people without adequate income, diet, housing and services." Chapter 18 gives emphasis on the growing effects of urbanisation on water demands and usage. These statements reiterates the importance of conserving the urban environment for the future generations to come.

Global statistics in this respect are alarming. Today more than a billion people live in conditions characterised by lack of adequate shelter, absence of clean water, inadequate

sanitation and practically little facility for waste disposal. In developing countries at least 600 million urban dwellers live in life and health-threatening situations. 60 to 70 percent of citizens in major Third World cities live in slums and squatter settlements. On an aggregate, nearly a quarter of the world's population is inadequately housed and of these more than 100 million are homeless. These statistics are not new to us. Extensive poverty, amongst others, is said to be a major contributor to this appalling situation. The agony and frustration of those who even lack basic necessities of life, food, shelter, clothing and facilities for sanitation and rudimentary health care cannot be quantified through drab statistics. No doubt that no other time in history have so large segments of population lived in such appalling conditions as today.

The problem is manifested with utmost severity in the countries of South Asia. Worse still, these countries are going to have anyway the lion's share of the world's population increase in the current decade. Even among the developing countries the problems of poverty and deprivation vary considerably both in nature and magnitude. In the coming decades the face of poverty, UNCHS report says, will become increasingly urban. Cities of South Asia, face challenges of survival and sustainability at a scale faced by no other cities of the world.

How one understands sustainability in development in a given city or town case? What analytical framework is useful for this purpose? How one defines various components of sustainability and attaches priorities for each? How the problems to life, environment and development are perceived by the city's local authorities, the residents and the professionals? Do their perceptions vary, if so, why and how? These are some of the questions which this paper tries to deal with. In dealing with the issue the attempt is to develop a model to facilitate understanding and policy formulation.

The model is based on three components, namely life sustaining component, life supporting component and development component. The interactive process between these three components is detailed in relation to the environmental, technological, socio-cultural aspects of the concerned population and the institutional/administrative setup in the city. The model is applied to a coastal town in Orissa state in India to find out its validity. The model attempts to explain a viable sustainable community size based upon the three systems i. e., life sustaining, life supporting and development systems.

## II. The Model

Sustainability in a Third World situation becomes meaningful in the context of the life supporting, life sustaining and developmental inputs. In a Third World country like India, better technology, strong, committed and efficient management, are the key inputs in this

context. Educational level, affordability and attitudes of the population towards community living are factors, when favourable, support the key inputs and help in quickening the process of development. The process of development may be considered in three stages. The first stage is life sustaining stage, followed by life supporting and development stages.

In case of a city's sustainable development what these three systems would mean ? Firstly, the three systems are interdependent and intricately interwoven. Life sustaining system incorporates the essential things needed for a reasonable living above the poverty line. The life supporting system consists of those variables which are necessary to achieve a higher order development without which still a progressive path for higher levels of development is not possible. The development system deals with the macro variables and their inter-relationships at the area or region levels. Continuous monitoring by the city authorities of each of the three systems and their interactiveness is necessary in order to achieve sustainability.

The necessary conditions through which the sustainability can be achieved at city level are :

- (i) *Socio-cultural base* : Family being at the core, it largely determines individual's attitude towards the community. The extent of family nucleation, socio-cultural institutions such as marriage, kinship, etc, level of neighbourhood cohesion, social crimes, religion, castes, etc., are all manifestations of family and individual's behaviour. Hence, these conditions have to be favourable to achieve sustainability in development.
- (ii) *Institutional base* : -Institutional base is an important predeterminant in the process of sustainability. The type and ability of institutions at the city level directly affects the city's progress. In fact, the management aspect of a city vests with the city authorities, namely local authorities, who control and initiate the development process. Without a proper institutional set up, no city can be sustained on a progressive development path.
- (iii) *Technological advancement* : Base scientific temper, awareness and acceptability of the community are important for technological advancement. Technology *per se* may not sustain the development process. Technology application also implies a factor of sustainability. Technology, particularly those appropriate and acceptable to the community helps to solve the problems faced during the period of achieving life sustaining and life supporting systems.
- (iv) *Communication and participation Base* : Communicative medium aiming at information storage and dissemination through television, newspapers, radio, telephone, facsimile, E-mail, is a powerful one. People's participation in the development process also largely depends on the level and quality of the available communication medium. Hence the means of communication should be clear, simple and affordable to evoke participation from

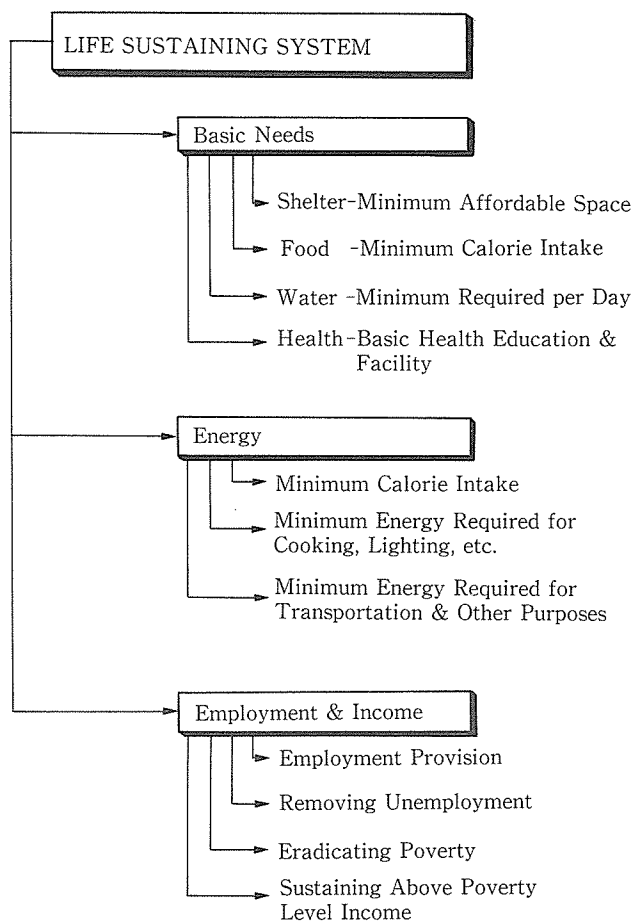
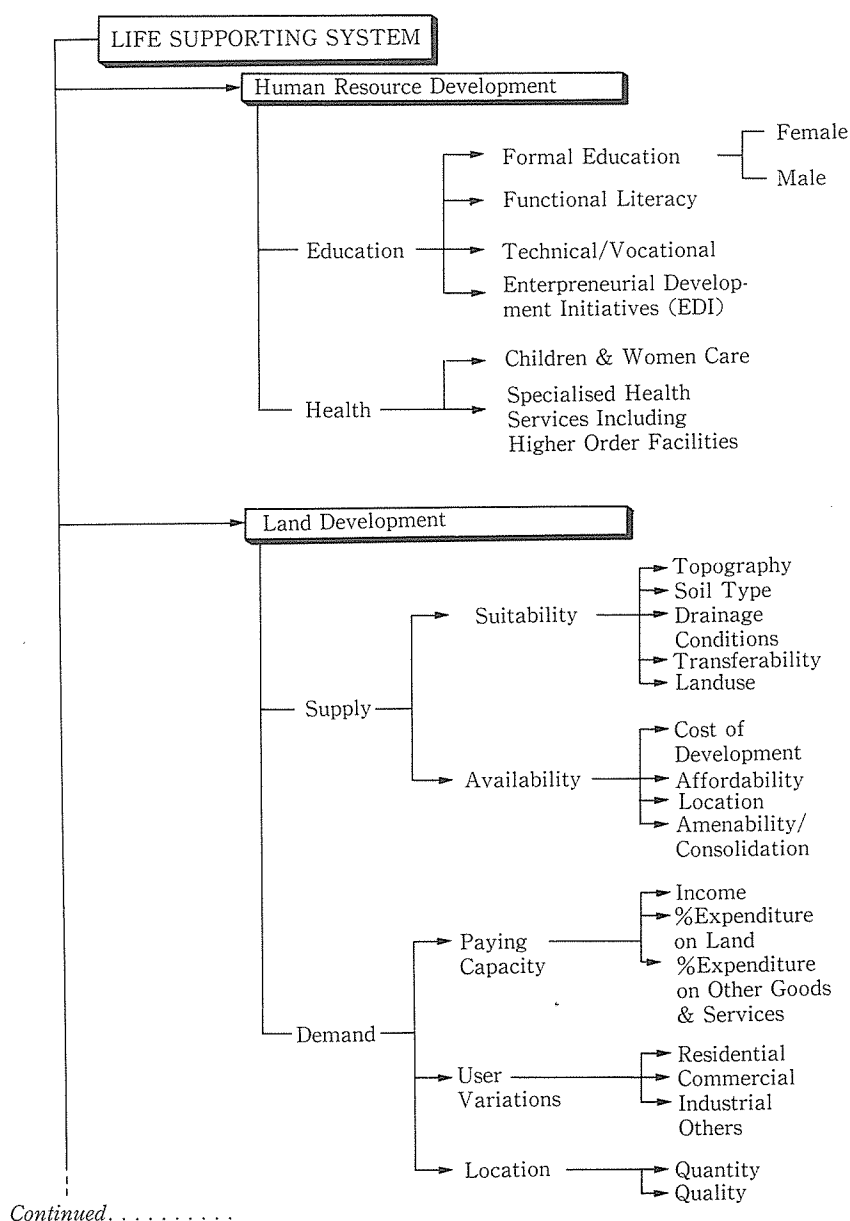


Diagram No. 1 LIFE SUSTAINING SYSTEM : A MODEL

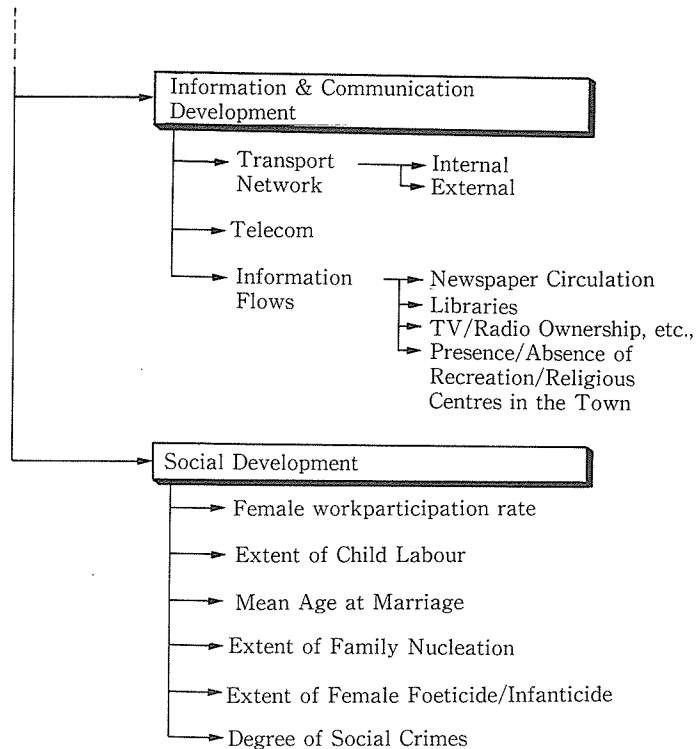
people at all levels. One of the prerequisites for the people to participate and communicate is basic education. Accordingly, one may argue that the provision of basic or primary education gains importance to achieve sustainability.

**The Life sustaining system** (Diagram No. 1) consists of those items which are essential for basic survival of a human being. These are Basic Needs, Employment and Income, and Energy. The Basic Needs can be further subdivided into food, water, shelter, health, education (particularly female education) and sanitation (See Diagram 2). For minimum sustenance, a minimum calorie of food intake is a must. In urban areas of India, the need is estimated to be 2400 calories per capita per day. Minimum food requirement is conditioned by factors such as food habits and preferences, age of the population, work type, etc. The available food distribution system, its price, and affordability play a vital role in ensuring food sustenance. The minimum requirement for water per capita is around 40 litres per



**Diagram No. 2** LIFE SUPPORTING SYSTEM : A MODEL (*Continued*)

capita per day. Access to safe drinking water, and in reasonable quantity by all is at the core of the life sustaining system for water. Next to food and water, a reasonable shelter is an important component of the sustaining system. The minimum requirement of shelter is a flexible norm. In India's urban scene, considering the low affordability of nearly half of the urban population, this norm assumes a specificity. In addition to affordability, a number of



**Diagram No. 2** LIFE SUPPORTING SYSEM : A MODEL *(Completed)*

other factors determine the sustainability as far as the shelter is concerned. Construction techniques adopted, availability of reasonable priced building materials, unit cluster design, adequate land supply and skill/labour availability, etc. are important determinants to provide reasonable shelter on a sustained basis.

Along with shelter, health care facility is important. Minimum requirement can be in terms of the number of doctors per thousand population, the number of beds per thousand population and the minimum health care available for all. Other parameters to be included in health sustenance include fertility, infant mortality, morbidity, waste disposal system, child and women care facilities, etc. General access to affordable health care facility by a common person is at the core. In this context, the access to indigenous facilities is of special significance. At the same time, capabilities of the administration to cope with emergency situation in health care in the event of outbreak of dangerous epidemics and to promote alternative health care system, including indigenous systems, is another requisite for achieving sustainable health care. In fact, health care and basic sanitation aspects emphasize the importance of female literacy and adequate awareness of these aspects.

Provision of toilets for use by the urban poor in India is a major challenge. The magnitude

of the need is enormous and cost is unaffordable by the public authorities. Innovative ways must be found to meet the challenge. Provision of basic sanitation, particularly toilets for use by the urban poor, therefore, forms part of the life sustaining system. Technology, particularly, like the Sulabh Souchalaya<sup>3)</sup> now widely practised in Indian cities and towns holds great promise. It has made it possible to provide for the sanitary facilities at a low cost for the urban poor. But the coverage is small. There is a long way to go in this regard.

Under the life sustaining system, employment and income generation is also considered. Removing under-employment and unemployment should be a major goal of all city governments. Improved urban productivity and increased employment opportunity demands higher levels of resource mobilisation. One of the major tasks for Indian city authorities is to eradicate poverty, and to provide opportunities for income that can be sustained above poverty level. However, many city governments in India with assistance from external, national and international funding agencies have only lately initiated urban employment generation programmes aimed particularly at the urban poor.

Unfortunately, however, urban employment programmes have not yet achieved any significant results. The growing informal sector is the major rescue sector, but significant proportions of jobs created through this sector continue to be marginal in terms of real income.

Energy is an important input for life sustenance. First, energy for the human body from minimum calorie intake through consumption of food and other articles. Second, energy is required in the urban area for lighting, heating, cooking and transportation. A minimum level has to be maintained for different uses of this energy. What should be that minimum or sustenance level depends upon the sources of energy available, and its cost of production and distribution. It is possible to quantify this and compute the sustenance level for energy requirement.

**Life Supporting System** (Diagram No. 2), consists of Human Resource Development—both in terms of quality and quantity, includes land development, amenities development, communication development, and social development. Human Resource Development is an important input in any process of development. For a life supporting system, it takes the form of mainly qualitative improvement. Quantity comes next. For this educational system available plays a vital role. It is not the basic education, but the technical and higher education which is required at this life supporting level. Areas which need special attention here are women's education, vocational/technical education, traditional skill development and entrepreneurial development initiatives (EDI).

Similarly, urban land sustainability issue has to be tackled in two dimensions, i. e., demand side and supply side. Land development depends, besides physical availability of land, upon

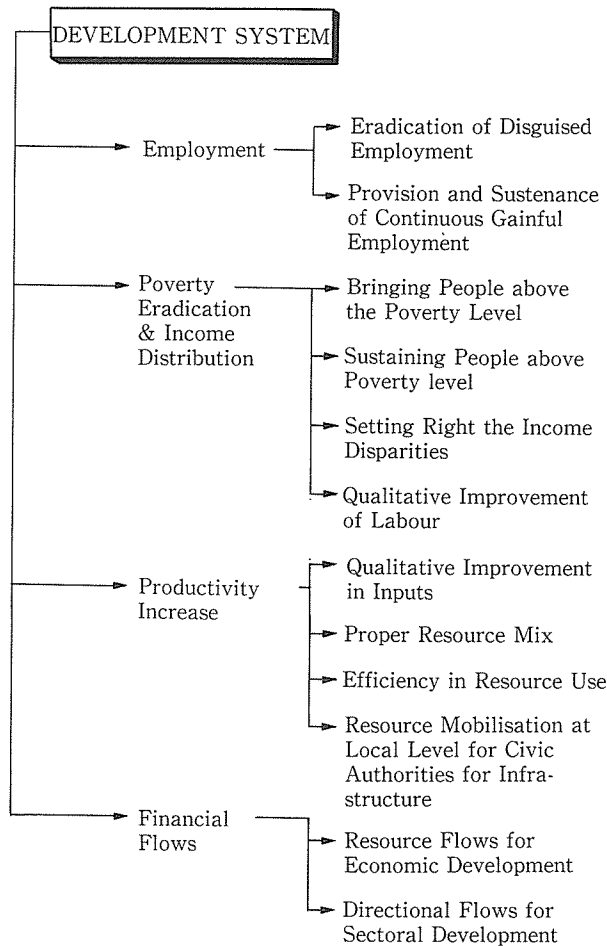


Diagram No. 3 DEVELOPMENT SYSTEM : A MODEL

the socio-cultural values, family ties within the society, even the capabilities to manage the land development process. The resources, particularly financial resources decide the extent of land development. From the supply side, two aspects are necessary to be considered. They are suitability, which includes topography, soil condition, landuse, transferability of uses, etc, and second, availability, which includes cost, affordability, and location.

**Development System** (Diagram No. 3) includes, among other things, provision of continuous gainful employment—both formal and informal. Increase in productivity, flow of credit and capital, higher capacity to mobilise resources, pricing policy and extent of subsidisation, higher levels of management, reduction in income disparities are important other components. The components of the development system become interactive with the components of the other two systems and contribute towards sustainability only when the other two systems (Life Sustaining and Life Supporting) are reasonably achieved.



### III. Behrampur : a Small Town in India<sup>4)</sup>

Behrampur is located in the coastal belt of south Orissa, a state in east India. Orissa is an economically backward state and its Ganjam District within which the town is located is also the most backward in terms of development in the state. The town faces a number of pressing problems like drinking water pollution, poor sanitary conditions, congestion in certain areas, slums, etc. The town was selected for field study in order to test and apply a theoretically evolved model on sustainable development in the context of a typical small town away from the mainstream of development. The town was visited for an intensive study.

Behrampur, though located on a national highway, a trunk railway and also well connected by a network of fairly good roads with the region, is a slow-growing district town away from the mainstream. Economically it is the nodal commercial centre of the Ganjam District and the surrounding region. Situated on a rocky ledge, the town is surrounded by an extensive cultivated plain gently sloping towards the Bay of Bengal about ten kilometers away.

With a population of 201,000 in 1991, Behrampur's growth rate of population over a decade is in the order of 30 per cent between 1981-91. The sex ratio is 923 females per 1000 males. The net immigration rate decreased from 25 per cent in 1971-81 to just four per cent in 1981-91. The overall level of literacy is fairly high and is around 65 per cent and the female literacy is 56 percent. Patronised by the British during their regime in India, the town developed as a part of the Madras Presidency. However, after the British rule and when the Orissa State was created, Behrampur became part of the Orissa State. The southern region of Orissa, in which Behrampur is located, is a neglected region in terms of development. The town has an elected local body and local politics is strong. There are at least two very active and dedicated NGOs operating in the town.

The Resource flows into Behrampur on which the entire sustainability depends was analysed in four categories namely, natural resource flows (i. e., water, food, etc.), semi-processed resources, processed resources and supporting resources. Each one of these resource groups was analysed at the city and regional level as well.

The most scarce commodity in the town is the potable water. Water is supplied to Behrampur through two systems that carry water from the river, located at a distance of about 15 kms from the town. The system, though fully established by the British but partly destroyed and abandoned by the local authority, is a carefully designed canal network, which brought water from the nearby reservoir through an ingenious network of 89 tanks and canals. This source releases 40 million litres of water per day but unfortunately on account

of poor canal network, only 25 percent or 10 million litres reaches Behrapur and is contaminated. This quantum of 10 million litres per day is supplemented by 144 tube wells within the town which supply 3.5 million litres of water to the town. Totally only 13.5 million litres of water is available for the town for its population of 201,000, on an average 60 litres per capita is available per day while the minimum need is 80 to 85 liters.

Apart from water, the town also is externally dependent on the region for vegetables, milk and fish. Except rice which is produced adequately in the district and even exported outside, for other cereals and pulses the town depends upon other surrounding areas and the neighbouring state, Andhra Pradesh.

**Table No. 1** SWOT Analysis on the Base

Medium/Base	Strength	Weakness	Opportunity	Threat
Soci-Cultural Base	<ul style="list-style-type: none"> <li>*Close/well knit community</li> <li>*Strong Local Identity</li> <li>*Social Commitment to develop the area</li> <li>*Awareness about the civic problems</li> </ul>	<ul style="list-style-type: none"> <li># Different Ethnic Groups with different tastes/preferences</li> <li># Low level of literacy</li> <li># Lack of committed leadership</li> <li># Strong religious bias</li> </ul>	<ul style="list-style-type: none"> <li>* Viable community size (in terms of strong ethnic groups)</li> <li>* Increasing knowledge about technology and its use</li> <li>* Awareness &amp; solution to the local problems thought of by different groups</li> </ul>	<ul style="list-style-type: none"> <li># Politicisation of civic issues</li> <li># Individual interest given more weightage</li> <li># No planning efforts at city level</li> <li># Strong ethnic and religious feelings retarding total development</li> </ul>
Institutional Base	<ul style="list-style-type: none"> <li>* Popular &amp; Strong local body</li> <li>* Local political commitment</li> <li>* Presence of many agencies to implement the schemes/projects</li> </ul>	<ul style="list-style-type: none"> <li># Lack of committed NGOs</li> <li># Devolution of administrative &amp; financial powers not there</li> <li># No commitment from administration for city development</li> <li># No integrated approach to developmental efforts</li> <li># Too much dependence on State Government for finance &amp; particularly for capital projects</li> </ul>	<ul style="list-style-type: none"> <li>* Presence of technical expertise at the local level</li> <li>* Possibilities of skill development</li> <li>* Implementation of 74th Amendment will enhance the powers of the local authorities</li> </ul>	<ul style="list-style-type: none"> <li># High degree of corruption</li> <li># High degree of cost &amp; time overrun in projects</li> <li># Multitude of institutions with overlapping of functions</li> <li># No clear definition on functions of each of the authorities</li> <li># Political influences on plan implementation</li> </ul>
Technological Advancement Base	<ul style="list-style-type: none"> <li>* Eagerness to know new technology exists in the society</li> <li>* Level of literacy improving which can enhance technology intake</li> </ul>	<ul style="list-style-type: none"> <li># Traditional society not that much amenable to new and quick changes</li> </ul>	<ul style="list-style-type: none"> <li>* Availability of low cost technology within the state</li> <li>* Access to new technology is easier because of strong communication linkages</li> </ul>	<ul style="list-style-type: none"> <li># Traditional and conservative society not willing to accept new changes in technology for fear of losing the quality</li> <li># Level of literacy too low to attract massive technology intake.</li> </ul>
Communication/ Participation Base	<ul style="list-style-type: none"> <li>* Presence of local dailies and National dailies in the city with good circulation</li> <li>* Flow of information to and from the city through fax &amp; other modes strong</li> <li>* Frequent public meetings by different political parties make the people aware of the local and state issues</li> </ul>	<ul style="list-style-type: none"> <li># Lack of education restricts majority of the people not to participate in decision thinking</li> <li># No proper channels of established communication</li> <li># No committed NGOs to communicate the issues of public importance</li> </ul>	<ul style="list-style-type: none"> <li>* Emergence of younger generation in the political decision making process</li> <li>* Awareness among the youths about the local issues/local civic problems</li> <li>* Informal channels of communication do exist in the form of temple meetings festive meetings, etc.</li> </ul>	<ul style="list-style-type: none"> <li># Even the existing channels of communication are through strong community leaders who interpret the problems in their own way.</li> <li># Misinterpretation of facts and problems exists</li> <li># The existing audio-visual channels are ill prepared or not bothered to voice for local civic issues</li> </ul>

In the case of semi-processed resources, such as minerals and building materials, the town is partially self-sufficient in terms of building materials like limestone, granite, etc. Marble chips commonly used in house construction are obtained from other parts of the country.

However, Behrampur, with its traditional handwoven skill in manufacturing silk sarees places itself high in the country. There are about 1400 families who make a living on this traditional craft. Silk weaving, which is famous in this town, is an inherited art and still thriving with popularity.

In order to further analyse sustainability in the development of Behrampur, a SWOT (Strength, Weakness, Opportunities and Threats) analysis of the different bases reveals certain weak areas and some strong areas which are useful in the formulation of development policies and strategies. **Table No. 1** reveals the results of the SWOT Analysis.

Here is an attempt not to understand sustainable development in a global or national context nor even in the context of non-renewable resource conservation but to clarify thinking about what sustainable development realistically means in the context of a small and poor Third World town.

#### Life Sustaining System in Behrampur

Life sustaining system in Behrampur is analysed in the context of three aspects viz., basic needs, employment and income and energy. The basic needs are further divided into food, water, shelter, health and sanitation.

Behrampur, which is located at the heart of the predominantly agricultural district, Ganjam, has the advantage of having surplus food throughout the year. Rice is the major crop of this area and usually it is exported out of the district. On the other hand, wheat, sugar and items of day to day consumption comes from the surrounding districts.

From the primary survey, it has been observed that 32 per cent of the town's population is living in slums, around 12,713 households living in 75 identified scattered slum pockets. Of the remaining 68 per cent of the population, 70 percent lives in owner-occupied houses and the rest as tenants. Out of the existing housing stock, only 52 per cent is fairly well maintained and almost 75 per cent of the housing is used by the low income group and the economically weaker section. **Table No. 2** gives a comparative study of spaces in different types of housing forms in Behrampur.

The comparative analysis of the space utilisation in different housing types of Behrampur reveals that the room space per person available in the traditional core areas, home based work areas, and the slums is very low, less than 10 square feet. Further the area under open spaces in the above-mentioned three types of housing is very small compared arith that in the planned housing developments.

**Table No. 2** Types of Housing Forms in Behrampur

	Traditional Homes	Homebased Work	Slum	HIG	MIG (Planned Development)	LIG	EWS
Plot Size (sq. ft)	300	250	145	2450	1325	1000	375
Builtup (sq. ft)	255	160	120	1350	1055	600	200
Work Area (sq. ft)	-	60	-	-	-	-	-
Openspace (sq. ft)	45	30	25	100	870	400	175
Household Size	7	6.5	6	5	5	6	6.5
Room Area/sq. ft	36	24	20	270	211	93	314
Open-Built-up Ratio	1 : 5	1 : 8	1 : 4.8	1 : 1	1 : 1	1 : 1.5	1 : 1

Source : Primary Survey, February 1994.

**Table 3** Existing Housing Supply in Behrampur

Income Category	Individual	Private Builders	BDA	Yearly Total	Existing Backlog	No. of Years Required
EWS	60	-	40	100	1456	14
LIG	200	-	90	290	2651	9
MIG	25	40	20	85	2225	26
HIG	15	10	20	45	857	19

Source : Behrampur Development Authority (BDA), 1994.

**Table No. 4** Resource Requirement for Housing

Resource	Item	Quantity
Land	Net Residential Area	145 Hectares
	Gross Residential Area	265 Hectares
Material	Bricks @ 300 Bricks/sq. m. of Built-up Area	347.2 Million Bricks
	Cement @ 4.16 Bags/sq. m. of Built-up Area	0.5 Million bags
	Sand and Metal @ 27 cubic feet/sq. m. of Built-up Area	31.1 Million per cu. ft.
	Wood @ 0.5 Cubit feet/sq. m. of built up area	0.581 Million cubic feet
	Stone required @ 8 blocks per sq. m. of built up area	0.37 Million cu. mt.
	Number of mandays required @ five mandays/sq. m.	0.58 Million Mandays
Human	Mandays required/year	0.58 Million mandays/yr.
	Labour required/year	1590 Persons applied for
		365 Days per year for a period of 10 years.

Source : Based on the Calculations from the Primary Survey, 1994.

**Table No. 5** Changes in the Landuse in Behrampur

(in hectares)

S. No.	Landuse	1964			1994		
		Total area	% to Developed	% to Total Area	Total Area	% to Developed	% to Total Area
1	Residential	392.80	35.30	13.44	578.23	46.07	18.22
2	Commercial	45.28	4.07	1.55	86.23	6.87	2.71
3	Industrial	40.64	3.65	1.39	49.64	3.96	1.56
4	Public/Semi-Public	153.20	13.77	5.24	156.20	12.45	4.92
5	Open Spaces	15.20	1.36	0.52	15.20	1.21	0.47
6	Water Bodies	153.60	13.80	5.30	103.60	8.25	3.27
7	Circulation	212.45	19.12	7.27	239.45	19.08	7.55
8	Vacant Land	99.36	8.93	3.39	26.50	2.11	0.83
9	Total Developed Area	1112.53	100.00	38.10	1255.05	100.00	39.55
10	Agricultural Land (within municipal area)	1810.27		69.90	1917.75		60.45
11	<b>Total Area</b> (within Municipal Area)	<b>2922.80</b>		<b>100.00</b>	<b>3172.80</b>		<b>100.00</b>
12	Settlement & Circulation (urban limit)	443.01			443.01		
13	Water Bodies & Agricultural	4304.19			4305.19		
14	<b>Total Area</b> (within urban limit)	<b>7670.00</b>			<b>7670.00</b>		

Source : Behrampur Development Authority, Behrampur

**Table No. 5, and Diagrams No. 4, 5 & 6** show the extent of concentration of population (density per acre), unit and cluster design of typical houses, indicators of housing stress –wardwise and the map showing the housing stress in Behrampur. In fact the analysis shows that the extent of housing backlog is in the order of 7200 dwelling units per annum. In 2001, Behrampur requires 31,350 dwelling units, including the houses meant for upgrading. **Table No. 3** gives the existing housing supply for Behrampur. It shows that to meet the existing demand for housing it may take even twenty-six years in some cases.

As such the rate of housing supply needs to be increased several fold if the existing backlog and additional requirement by the year 2001 are to be met. For a net residential area of 145 hectares (Gross residential area of 265 Hectares) the funds required are estimated and presented in **Table No. 4**.

From the table it is clear that the task ahead for achieving sustainability in housing is difficult in the normal way, unless innovative methods are found to augment supply and reduce construction costs significantly.





# INDICATORS FOR HOUSING STRESS

STRESS VALUES 12 FOR >50%, 10 FOR 20-50%, 8 FOR 0-20%.  
OPEN SPACE/1000 FOPIN: EXCLUDING WATER TANKS.  
STRESS VALUES 10 FOR <0.2 HA/1000, 8-0.2 TO 1 HA/1000, 6->1 HA.  
MAINTENANCE: ACCORDING TO % OF POORLY MAINTAINED.  
STRESS VALUES - 8>20%, 6 FOR 15-20%, 4 FOR <15%.

**>80 - HIGH STRESS**  
**75-80 - MEDIUM STRESS**  
**<75 - LOW STRESS**

# APPROACH TO SUSTAINABLE DEVELOPMENT

Diagram  
No. 6



## Water Supply

In the case of water supply, even though 13.1 million litres per day (MLD) of water is available for supply, only about 85 to 90 per cent is actually supplied every day. The per capita daily supply of water is in the order of 55 to 60 litres in place of a minimum requirement of 85 litres. The wardwise distribution of water supply varies between 37.47 litres to 276.76 litres per capita per day which reveals very skewed distribution in the water supply. However, to sustain the current population with adequate potable water, Behrampur requires about 40 million litres per day. This water quantity can be made available if the available traditional canal system's capacity is fully revived and utilised. For achieving this, not only structural modification of the canal system is required but also the capacity of the water treatment plant has to be significantly augmented and the distribution network technically improved. In addition to this domestic consumption, an additional 30 per cent is required for non-domestic purposes.

Apart from the demand and supply of quantity of water, the crucial aspect of Behrampur's water problem is its quality. The test reports reveal very high levels of suspended materials, high contents of micro organisms, albuminoid ammonia and other organic impurities. In addition to this poor quality of water, there are also heavy distributional losses which goes up to ten to fifteen per cent of the total supply levels. The laying of the pipes carrying drinking water is also faulty. In many cases these run along the choked drains and even inside the waste water drains. Contamination through seepage is common. In other words, the priority tasks to ensure reasonable level of supply of potable water on sustained basis include not only augmentation of the source and treatment of the water but also improvement of the existing distribution network.

Unless supply capacity is augmented and the existing distribution network is streamlined, a sustainable level of potable water to Behrampur is impossible.

## Sewerage and Garbage Disposal

There is no sewerage system in the town. 48 per cent of the households have septic tanks, while 28 per cent have the deposit system. The rest, consisting mostly of the poor, use the open fields for defecation. Insanitary conditions created as a result have alarmingly increased the incidence of diseases caused by contamination of the underground water in a large area of the city.

Garbage collection per day in the town is in the order of 73 tonnes, i. e., 3.4 kgs. per capita which includes, domestic, commercial, and industrial wastes. The municipality collects garbage from various points using trolleys and dumps the same into trenches in earmarked lands located nearby. Almost 80 per cent of the population dumps domestic garbage on the

street on account of the lack of any organised system.

Healthwise the town suffers from many water-borne diseases. This is mainly due to poor quality of water distributed. Most people of the town know about the water problem. Lack of knowledge prevails extensively among the poor households about the precautionary measures that can be taken at the family level to purify the water supplied through tap. Number of hospitals and also the private health care facilities are totally inadequate and the number of doctors in the town is very low. However, the city has medical college and an attached hospital with 60 beds. Community health care-based on traditional practices is not popular and it serves only a small fraction of the population. However, there exists a good potential.

### Employment and Income

Bhrampur being an important trading centre, offers more informal sector jobs than the formal sector ones. The district is industrially backward and does not possess many skilled labourers nor entrepreneurs. 54 per cent of the population are in the working age range. The dependency ratio is very high, in the order of 75 percent. Workers constituted only 26.4 percent in 1991, indicating a large section either grossly under-employed or unemployed. Bhrampur being a trade and commerce town, most of the jobs are concentrated in this sector. Within this sector again, informal labour dominates. Though the ratio of employment in the informal sector to that of the formal sector is 1.25, the proportion of percapita income from formal sector to informal sector is in the order of 3:1. The informal sector income varies between Rs. 400per month and Rs. 2500 per month (US \$1.00=Rs. 31).

### Energy

As per the intake for body energy intake, the average calorie intake was found to be only about 1600 calories per day, the required minimum is 2400 calories per day. Even though food expenditure constitutes 70 per cent of the total expenditure of the households, the quality of the food intake is low. Health, shelter and energy use other than food occupy the second, third and fourth in terms of priority in household expenditure next to food.

Domestic energy requirement dominates (63 percent) the consumption of electricity in Bhrampur, followed by commercial and small industries. Of the total electricity connections, domestic connections constituted 61 per cent and 63 percent within a span of two years. This reveals the increasing demand for energy from the household sector. The average domestic consumption of energy per household is only about 25kwh per month. Even the traditional handlooms have not been mechanised for using energy. No energy is produced either from non-conventional sources such as biogas or solar.

## Life Supporting System

The model for the Life Support System is explained in Diagram No. 3 in detail. The main components of the system are (i) human resource development, (ii) land development, (iii) information and communication development and, (iv) social development. Each of these components are elaborated below.

**Human Resource Development** is to improve the quality of available human resource to achieve overall sustenance. Human resource development in the case of Behrampur primarily should aim at education and health improvement. Education consists of formal education for both male and female, functional literacy, technical/vocational education and entrepreneurial development initiatives (EDI). It may be easy to fix target for formal education, for example 100 percent literacy programme, but for functional literacy or technical/vocational or EDI it is not easy to fix such a target. It requires keen motivation, participation and acceptance of the people. Moreover a decision to fix a target for functional literacy and vocational training or for that matter EDI should be tied up with the town's economy and needs. However, within formal education, it is necessary to fix a target and take actions to achieve the same. This, among others, must have augmentation of female literacy and education at its core. To find more effective means to reduce dropouts in the school at the primary-middle stage is yet another priority task.

In the context of Behrampur, the female literacy increased from 39 per cent in 1981 to 56 percent, while the same figure for male, increased from 61 percent in 1981 to 72.6 percent in 1991. Nine percent of the school-going age children do not receive any kind of education. The aim in this case would be to achieve 100 percent enrolment and to improve the female literacy level. Provision of adequate number of schools of girls only, and increase in vocational training cum work opportunity for girls are important.

Special vocational training to motivate housewives to be trained in para-medical health care, personal hygiene and sanitation and also in small income generating activities is a must. The relatively high female literacy and presence of effective NGOs should be decisive advantages in this context. Behrampur, which serves as a regional node, also performs certain central functions in the field of education. Some specialised colleges/professional colleges are located in Behrampur. Compared with the adjoining parts of the state and also average conditions for many states in India, the literacy level of the population of Behrampur is high, especially for the women. As said earlier, this should be a good potential to help create conditions for sustainability.

Human resource development in Behrampur is largely constrained by high morbidity rates caused by water borne diseases which are found to be in the order of 81.8 per thousand population. TB and other bacterial diseases account for 19.4 and 16.3 per thousand respec-

tively. Surveys show that 23.2 per cent of the population suffer from nutritional deficiencies, while 43.6 percent from some forms of anemia. Other than these diseases, severe diseases such as pneumonia, influenza and bronchitis are also found in the town. These statistics reveal the extent of impact on the quality of life in the town caused by poor health care and sanitation conditions. Doctor/population ratio is around 1:1231, population served per bed is 1:199, and population served per a reasonable hospital is found to be 1:42,084. Increase in the incidence of diseases over the years is mainly due to poor quality of drinking water and poor sanitation. Depending upon the resource availability, the local government, as a priority task towards sustainability, should ensure at first reasonable availability of potable drinking water and increase the quantity of water supply to all and improve drainage and solid waste disposal. Standards for each of the health delivery system should also be set up. Properly designed extension work using the assistance of NGOs, and community building organisations to improve awareness levels for better sanitation and personal hygiene methods should also be a major task for the local authority. The presence and effective functioning of some non governmental organisations in the town, taking care of the health needs of the women and children of the town, is a great potential. Institutions like Society for Enlightenment and Voluntary Action (SEVA), Organisation for Development, Integration and Social Action (ODISA), and Daughters of Charity are already doing good service to the cause of the poor women and their children though in limited scales. The strength and reach of these institutions need to be supported.

Though some efforts are made by the local, state and the central governments to collect health statistics, many aspects of the health problem are not reported to the local authorities often because of ignorance even social stigma. For example, causes of female foeticide and other related aspects are hardly reported. Similar is the case with serious diseases. These constraints in many ways hinder development of sustainable health delivery system in the town. Increased awareness education etc. through intensive extension services are priority requirements.

**Land Development**, which forms part of the life supporting system is an important aspect in the overall development of the town. Without proper understanding of the land supply and demand mechanism, it may be difficult to formulate a sustainable model for the town especially when the available land for future expansion of the town is limited. Bhrampur covers 7,670 hectares, of which 40 percent is developed and the rest is fairly good agricultural land. Out of the developed land, 46 percent forms residential, 8.3 percent forms the water bodies as is shown in the following **Table No. 5**. Organised open spaces cover too small area, only 1.2 per cent of the total area. To accommodate future development the town has grown at the cost of the water bodies, some agricultural land and open spaces. **Table No. 5** presents

the change in the area under different uses in 1964 and 1994, i. e., within a thirty years' period.

**Table No. 5** reveals that the land under the natural water bodies within the municipal area and open spaces has significantly declined during last 30 years. The land for urban use is limited. People, judiciously somehow have only used small pockets of good agricultural land around for urban use. Though the population increased by 120,418 between 1964 and 1994, the developed area increased only by 142.6 hectares during the same period. Obviously infilling of the existing developed area continued. As a result 1964 density (per hectare of developed land) of 80 persons increased to 168 persons per hectare in 1994. While outward expansion of the town area was controlled, within the existing limits some vitally important water-bodies were built upon and the increased density within is unsustainable on account of the low level of life sustaining and life supporting systems.

If we see the subsystem for land development in **diagram No. 3**, it may be clear that apart from the above facts, many other aspects also needs attention in Behrampur. From the supply side, land suitability, soil type, drainage conditions, etc. plays an important role. In Behrampur, the drainage pattern shows a very very gradual slope towards the seaside about ten kilometers away. Within the city, there is not much change in the topography and local drainage is absorbed by the natural depressions, ponds, etc. Large areas, however, owing to defective drainage and filling up of the natural depressions, suffer from water logging during the rainy season. Under pressure of growth, some natural depressions and a number of ponds which have played vital role in maintaing drainage and hydro-cycle in the area undesirably have been filled up.

The cost of development and the input requirement for land development are presented in **Table No. 4**. The land cost varies between Rs. 150 to 290 per square meter in Behrampur depending upon its use. In the surrounding agricultural area, the land cost is low but the development cost for these agricultural land is very high because of low lying character. Further, these good agricultural lands, the mainstay for food, should be preserved.

### Information and Communication Development

In this section, information and communication development is analysed in terms of road/transport network, telecom facilities and information flows.

Behrampur is well connected by the National Highway No. 5. Apart from this important link, it is also connected by District Highways and other roads. Encroachments on the National Highway as well as within the city roads directly affects free flow of traffic within the city as well on the highway. The presence of a large number of informal shops with virtually no control on their location, is a major hindrance to the traffic flow. The town with its regional functions also attracts traffic from the surrounding districts. Inter- as well as

intra-district traffic in Behrampur is rather high. The total number of registered vehicles increased from 12,288 in 1990-91 to 12,755 in 1992.94 percent of the vehicles, however, constitute slow modes namely, rickshaws and cycles. The intra-city movement is fairly good using cycles and rickshaws. Limited spread of the town is an advantage, but encroachments on the right of way of the roads is the problem.

Advancement in telecommunication is a major asset in any development effort. Behrampur is well connected by telephone lines to the outside world. Within Behrampur, there are 7,200 connections with, of course at present, only a manual exchange. On an average 2,500 incoming calls and 4000 outgoing calls are made from the exchange daily. Telex facility is also available in 18 places within Behrampur. Fax facility also exists in the town at two places. From the view point of both transport and telecommunications, the town at present is fairly well provided with, considering the nature of the demand scale of activities.

**Social development** is an important requirement in Behrampur as there live different ethnic and caste groups with different levels of development. In the case of Behrampur, female work participation rate, extent of child labour and mean age at marriage, extent of family nucleation, extent of female foeticide, and the occurrence of social crimes were considered most appropriate for measuring the extent of social development in the town in different ethnic and caste groups. Though the female literacy level is high in the town (56 percent in 1991), the work participation by female is too low. The female work participation in the town decreased from 7.7 percent in 1981 to 7.4 percent in 1991. Among the female workers, most of them (76 percent) were employed in the tertiary sector. The percentage of children below thirteen age is high (39%), but not considerable percentage of this group is on job. Incidence of crime in Behrampur as per the discussion with police officials is relatively low and only petty crimes like small thefts are common. Considering this and the fact that the town does not have any serious kind of social unrest, it is reasonable to conclude that the quality of social environment there is high with very low incidence of crime, social unrest, etc. Social crimes such as rape or molestation, etc, are also very rare. Family size in Behrampur is decreasing, from 6.2 persons/family in 1961 to five persons/family in 1991. Nucleation process is underway as expected with urbanisation. Negative impact of the family nucleation is already visible in Behrampur. The social interactions among the nucleated families are very low as compared with those of the traditional undivided families. A sample survey done at Behrampur at three different areas, viz., traditional area, intermediate areas and in the new urban extension areas reveals that in the traditional area, person to person contacts are maximum compared with other areas. While 76 per cent of the families living in the traditional area reported active participation in community activities, the proportion dropped to 19 in intermediate areas and significantly nil in the new areas. This indicates family

nucleation and the resultant level of social interaction and practically non-involvement in community activities by the families in the newly development areas.

### Development System

The most important component in the development system is economic sustainability ; employment generation, poverty eradication and income distribution, productivity increase and flow of resources for development. These aspects assume special significance for a Third World country's town for achieving sustainable development in terms of economic growth and growth sustenance. Effective analysis of the development system at this town level is constrained by paucity of data, especially about disguised employment, unemployment, etc. The unemployment statistics often provided by the official records are misleading and at times incorrect. The same is the case for assessing poverty levels. Income data is equally hard to get. Poverty figures at the national level are based on consumption pattern and, according to this norm, a majority of the town's population should be categorised as being below poverty level. But, abject poverty as commonly seen in large cities in number of beggars, destitutes and pavement dwellers, is practically absent in Behrampur. Salaried jobs in the public and private offices constitute not more than 25 percent of the workers, about 20 percent are self-employed in small and large enterprises. Industrial activity is very small, and provides job to less than 6 percent of the workers. Bulk of the jobs are in the sectors of retail shopping and services, largely informal. Surveys showed that nearly 20 to 25 percent of the households supplement their income from produce of their agricultural lands. On account of slow increase in new employment, migration to the town over the last decade has declined. The 3 percent annual increase in the town's population is largely due to natural increase.

### Concluding Observations :

This paper is not intended to list up prescriptive actions for achieving sustainability in the future development of Behrampur. Instead, the paper attempts to identify the critical areas where action should be concentrated to achieve the same objective. Before we do that, we put down in brief the special advantageous and disadvantageous conditions that the town is in.

- (a) Behrampur is a typical example of hundreds of such towns in India, which continue to retain a human scale in development, small in size and extent, approachable easily by a cycle. Though regional transport linkages are strong, the development impulses which could undesirably quicken the pace of growth are not yet seen in the town. Similarly, flight of resources from the town to outside is also not there. Agricultural lands around are fertile, but are at present under monoculture, paddy. There is potential for crop diversity,

provided that irrigation is improved. Local people have a high level of entrepreneurship exceedingly well demonstrated in handloom silk weaving and in processing of various agricultural produce. While the former has a national heritage as well as high commercial value as handicraft, the latter is being mainly done on a small scale for limited consumption. Both, however, have tremendous potential and commercial prospects for the future. At present only 1400 families (8500 persons) are dependent on silk weaving for living, but nearly equal number of persons is indirectly dependent on the activity for living. The handicraft for high quality products must be protected and encouraged to use only the traditional methods. For lower quality products, however, mechanisation of the looms is desirable to sustain a higher level of production. There is already a voluntary cooperative association which regulates the weaving activity of nearly half of the weaving families, ensuring market outlets and acceptable price lines. The efforts of such agencies should directly be supported and facilitated by the government through credit and technical help. By this, gainful employment in the weaving sector can be increased at least three fold in five years.

- (b) Another very advantageous condition is the prevailing general social amity and very low levels of crime in the town. From this point of view it is a lovable place to live in. The small and humane size and organic mixing of different ethnic and caste groups seems to have contributed to this advantage. Planners and decision makers should find ways and means to keep up the advantage. Development per se, physical and economic, which does not benefit the majority of the population, particularly the low income category, must be avoided. Development which is dependent on large scale immigration perhaps should also be avoided.
- (c) Yet another advantageous condition is the presence of relatively high levels of literacy especially among women. There is also seen a great desire for the women to increase their level of education and awareness. This great potential must be carefully and effectively utilised in planning and organising personal hygiene, sanitation, child care and neighbourhood community groups. Facilities to augment further the levels of literacy and education, especially for the women, obviously demand high priority.
- (d) The most disadvantageous condition is the contamination of drinking water, disruption of the natural drainage systems and, to some extent, contamination of the underground water also. This problem is a serious one, but can be easily solved by careful planning and more sensitivity of the city authorities towards simple ecological and environmental dictates of the area.

In our opinion, an agenda for sustainable development in this small town does not need to include high tech inputs, nor flashy market oriented economic approaches, nor even high



financial (capital) investments which often flows through as loan from multinational external agencies. What is needed first is to realistically identify the actual felt needs of the people, find means to strengthen their intrinsic capabilities, entrepreneurship and community strength. Basic life sustaining conditions, particularly ensuring adequate potable water, preventing contamination, maximisation in the utilisation of local resources including local skill and craft, facilitation for attaining higher levels of functional education especially among women, strengthening of the local NGOs and CBOs are priority areas of action. Economic development, creation of new gainful employment are necessary, but in practice must coexist at equal priority with human resource development and utilisation of the local potentials and resources.

## NOTES

- 1) In fact this view is debatable because, even the resource use result in pollution in some quantity, which may not lead to sustainability of an area. For example, in the advanced countries wherein Green Movement spread, the consumption of fuel or the quantity of solid and liquid waste disposal never declined. So in terms of consumption, a country may take precaution but in terms of disposal if it neglects the waste then the problem starts.
- 2) Pigou's idea of economic well-being is, to make some people better off without affecting others. However, in terms of sustainable development or in the context of current economic scene in the world, it is not always possible to achieve this Pigouian equilibrium. This is mainly because of the existence of dualism in development among the countries of the world. In a much stronger form is that of emergence of dualistic development *within* a country, wherein there is a co-existence of the rich and the poor, resource rich and resource poor regions. Hence, as far as the Pigouian economics is concerned, it may not be directly applicable to environmental science particularly wherein dualistic development persists.
- 3) Sulabh Souchalaya is a low cost sanitation technology popularised by Dr. B. Pathak in India. It started in a small scale in one of the Indian states, and now acquired global popularity owing to its minimum cost and easy access.
- 4) The study was carried out as a part of the studio exercise for the second semester students of the Master's Degree in Urban Planning at the School of Planning & Architecture, New Delhi during January -April, 1994.

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