National Geographical Journal of India, An International Peer-reviewed and refereed Journal of India (NGSI-BHU, ISSN: 0027-9374/2016/1573), vol. 62 (1), March : 1-20

Changes in the Regional Differences of the Health State in Hungary after 1989

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In the state of health there are considerable regional differences within countries owing to complex interaction of numerous factors. According to the survey of UN these differences are more important, because very often they mean sharp spatial differences. In the post-socialist countries including Hungary radical political, economic and social changes have taken place after 1989 which have had a great impact on the state of health too. The main aim of this study is to reveal the changes in the regional differences of the health state of the Hungarian population. The basic question is how the geography of the area with good and bad health changed during the last decades. Based upon the available statistical data at three different times some major health indicators are analysed at regional level after 1989. Illustrations indicate spectacularly the changes regional differences. When analysing them, it turned out that the regional differences in the state of health of the Hungarian population were generally intensifying, and that the spatial pattern of areas with favourable or unfavourable state of health had been also modified during the last 25 years. It has also become obvious that the regional differences are persistent and they are partly determined by inherited regional differences.

Keywords: Health state, Regional differences, Health indicators, Hungary.

Introduction

In the eastern half of Europe, in the development of the former socialist countries (including Hungary), a radical turnaround took place in 1989. Socialism collapsed and a market economy began to be established. Over 25 years have passed since then and striking economic and social changes have taken place. New phenomena have appeared (e.g. enterprise, unemployment, poverty) and accommodation to new challenges (e.g. intensifying competition) has had to be made, which have affected not only economic actors, but also the members of society, in highly sensitive and very differentiated ways. All these great changes occurring within a short time have also affected health state (Dumitrache and Armas, 1998; Kiss, 2009). In Hungary and some Eastern European countries (e.g. Baltic states, the Ukraine, Russia) the health state of the population has become much worse than it could be expected by the economic development of these countries. This phenomenon is called by the Central Eastern

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European health paradox (Cornia and Panicia, 2000; Kopp and Skrabski, 2007).

Winners and losers of the political changes in the post-socialist countries can be observed not only in economy, but also in society, and regionally too. The biggest losers in Hungary were the areas (e.g. North Hungary including Borsod-Abaúj-Zemplén, Heves and Nógrád Counties) which had previously advanced heavy industry, because due to the decline and closure of these branches many lost their jobs, their income fell and therefore their living conditions became less favourable. Already underdeveloped during the period of socialism, the north-eastern (Szabolcs-Szatmár-Bereg County) and south-western areas (Somogy County and some parts of Baranya and Zala Counties) were also affected negatively by the political changes, because the local aging population, less educated, less healthy and poor for the most part, and comprising less than 30% Gypsies on average, was even less able to adapt to the new conditions. At the same time there were some areas (e.g. the metropolitan region and North Transdanubia including Gyõr-Moson-Sopron, Fejér, Komárom-Esztergom, Vas and Veszprém Counties), where the economy developed rapidly, because the inherited infrastructure was more developed, transport connections were good, the workforce was educated, and the geographical location was favourable (Kiss, 2010). Today there are a number of automotive companies and their suppliers in operation here, and these are the most dynamically developing areas in the country. And this has had a favourable influence on the health of the local population. It is generally observed that the state of health of the population is usually better in the areas with a developed economy than it is in the less

developed areas with a lagging economy (Egri, 2012; Kiss, 1993; Kiss and Singh, 1997; Pál, 2013; Uzzoli, 2003, 2010). Consequently, the differences observed in the state of health are explicable in part by the diverse social and economic conditions in the individual places. In recent decades, studies have assigned an ever greater role to the quality of geographical "places" and to geographical location in the determination of the state of health (Bolam, et al. 2006; Kearns and Moon, 2002; Veenstra, 2005). After the political changes, the assessment of geographical location and the "place", also changed in the post-socialist countries (Ian Hamilton, 1995). Their significance has increased in value.

There are considerable differences in the health status of the population not only among countries, but also within countries. According to the survey of United Nations the latter is more and more important, because in many cases sharp regional differences can be observed in a country (Uzzoli, 2010). This can be said about Hungary too. To reveal them and the changes in the spatial pattern of regional differences after 1989 are the chief aim of this study. The main question is how did the geography of the areas with good and bad health change in Hungary during the last 25 years? The answer may be given by means of examining a few major health indicators (life expectancy at birth, mortalities by chief causes) at three different times and at county level. A cartographic depiction of the individual indicators at medium level (19 counties and the capital city, Budapest) clearly marks the regional differences, which is made possible by the available statistical data (Figure 1).

The medium level investigations were motivated primarily by the fact that there are

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Figure 1. Location of Hungary in Europe and its administrative division

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no available published statistical data at municipal level. Although, it is undoubtedly these would provide more accurate information on the regional differences in population health. Besides these, the experiences obtained from the accessible literature as secondary sources have been also relied on.

After this introduction, the next section based upon professional literature examines the factors determining the state of health with particular regard to their spatial characteristics in Hungary. The third section demonstrates the changes in regional differences of some more important health indicators. Finally conclusions follow.

Factors determining the state of health

The health status of population is the result of complicated interaction of many factors, which show great similarity. Basically the factors determining health can be listed in following four main groups (in parentheses their significance), which are :

- genetic (inherited) and acquired characteristics (e.g. age, sex) (27%),

- lifestyle, conduct (eating habits, healthdamaging factors, physical exercise, etc.) (43%),

- condition of the environment (natural, social, economic environment, etc.) (19%),

- healthcare system (access to healthcare institutions, facilities, standard of care, etc.) (11%) (Lalonde, 1981). As the presence of these is differentiated in time and space, the extent of their influence also differs, so the state of health also varies depending on time and place.

Of the four groups of factors, lifestyle has the greatest influence on the state of health, in which great regional differences can likewise be observed in Hungary according to a survey carried out recently (Ambrus and Varsányi, 2011). For instance, there is a lower than average percentage of obesity in the western part of the country, and a higher one in the eastern part. A similar spatial distribution was registered in the frequency of fruit and vegetable consumption. The greatest attention is paid to a health-conscious diet in Central Hungary. The proportion of regular smokers was the highest (34-29%) in Southern Transdanubia and Northern Hungary, whilst it was lower (24-25%) elsewhere. In general, the proportion of non-smokers is higher among those with advanced qualifications, and among those with lower school qualifications the ratio of heavy smokers is higher. In alcohol consumption, the population of the more developed parts of the country was in the frontline, where the combined ratio of moderate alcohol consumers and heavy drinkers amounted more than 20%, in contract, the figure in the Eastern part and Northern Hungary was 15-16% (Ambrus and Varsányi, 2011).

Besides lifestyle, genetic features which are present from birth are considered the most important in assessing the state of health. The two groups of factors together are "responsible" for 70% of the state of health, in contrast to environmental effects, the quality of the social and economic environment and the standard of the healthcare system, which "only" affect 30%. Although it is difficult to measure the actual effects of the individual groups of factors precisely, there is no doubt that a person's lifestyle, health-consciousness, attitude to health, etc., have a significant influence on the state of health, but it also depends on many other factors (e.g. age, qualifications, occupation, etc.), in which there are also relevant regional differences in Hungary .

Therefore, it is worth to analyse them in more detail.

Very often age also contributes to the development of certain diseases, or to higher morbidity. For this very reason, age is an important differentiating component in the assessment of population health. And as illness is more frequent at an older age, the proportion of the elderly is of indicative value for the state of health of the population. The aging of the population has also intensified in Hungary. Over 25 years the number of the elderly per hundred young people has almost doubled (it was 117 in 2014). The least numbers of the elderly are in NE Hungary (Borsod-Abaúj-Zemplén, Hajdú-Bihar and Szabolcs-Szatmár-Bereg Counties) and Pest county, due to the high birth rate and suburbanisation.

The correlation between the health state and educational level is very close (Kopp and Skrabski, 2007). In Hungary the educational level has greatly improved since 1990. At present, about 20% of the population 25 years old and over have a college or university qualification. Although, their share is continuously increasing, the regional differences persist. Outside the capital city (Budapest), education levels are better, i.e. more people have qualifications, in those counties (e.g. Hajdú-Bihar, Csongrád, Baranya) where higher educational institutions are in operation.

We can draw conclusions on economic inequality which is reflected in the population's income situation, living conditions and the state of development of settlements, for instance from the regional distribution of GDP per capita, or from unemployment data (Enyedi, 1993). The spatial peculiarities of the two indices show many similarities. The areas with high (above USD 8,000) and low (about USD 5,000) GDP per capita can easily be distinguished within the country, and these go together with low (5% or less) and high (10% or more) unemployment. After the capital city, the counties of Northern Transdanubia belong to the former group, which is basically due to the developed industry there (Kiss, 2010). The persistently less developed counties (e.g. Békés, Borsod-Abaúj-Zemplén, Nógrád, Somogy and Szabolcs-Szatmár-Bereg) in part were already less developed areas in earlier times, and in part had ended up in an unfavourable position due to the severe crisis in the traditional branches of heavy industry following the political changes, or even because the interest of foreign investors was not significant due to the unfavourable geographical location and poor transport connections. These counties have several such areas which are persistently underdeveloped (Pénzes, 2015).

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The regional differences in the level of socio-economic development become even more sharply defined in times of crisis. Because of this, the state of health of the population deteriorates to a much greater extent in the areas hit by crisis (e.g. the frequency of deviant forms of behaviour increases, there are more who struggle with various kinds of psychiatric symptoms, etc.) (Kiss, 2009). The state of health in Hungary deteriorated more intensively in the first half of the 1990s following the change in the political regime, and also as a result of the economic crisis which broke out in 2008. Mental and psychological illnesses also became more frequent due to hopelessness, feelings of being unwanted, anxiety, stress, etc. Particularly, mental diseases and chronic stress are the main causes for the worse health state and higher mortality in Hungary (and Eastern

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European countries). In fact these factors explain primarily the Central Eastern European health paradox, because other factors (e.g. genetic, poverty, traditional risk factors) did not have a significant impact on the health state after 1989 (Cornia and Panicia, 2000; Kopp and Skrabski, 2001, 2007).

Studies over the last decade have revealed that soaring unemployment as a result of economic difficulties is the factor which has the most negative influence on the state of health (Böckerman and Ilmakunnas, 2008). So unemployment not only has an unfavourable effect in general, but particularly so in times of economic crisis. Because of this, it also has a relevant role in the inequalities of health in Hungary too. Unemployment or becoming unemployed has also contributed to the higher mortality rate of middle-aged men in Hungary, because they cannot cope with this situation, they cannot work up it, and these lasting mental problems finally lead to their early death (Kopp and Skrabski, 2001, 2007).

The causes of health inequalities in short PROGRESS (place of residence, racial/ethnic affiliation, occupation, distribution by gender, religious affiliation, educational qualification, socio-economic situation, social capital, social resources) indicate more precisely what kind of factors influence the state of health the best (Oliver et al., 2008). Lately these are more and more important, especially social and mental factors.

The state of the social environment is likewise a function of many factors (e.g. standard of cultural literacy, traditions, social structure), which also have an impact on health to some extent. It is a well known fact that the more disadvantageous someone's social

situation is, the worse their state of health will be (Jones and Moon, 1987). This has been corroborated by an investigation completed recently. In the areas of the country in the most disadvantaged situation, where the health of the population is very poor, it has likewise been observed that the low level of the state of health does not primarily have an ethnic basis, but it is much more a function of whether the person in question is penniless or not, unemployed or not (Pál, 2013). Research carried out in the underdeveloped territory of the Middle Tisza Region has also proven that the state of health of the population is worse than average there. Middle Tisza Region is that part of the country where the area of four counties - Borsod-Abaúj-Zemplén, Hajdú-Bihar, Heves, Jász-Nagykun-Szolnok - meets. Mainly the life prospects of the poor, unemployed ethnic Gypsies, living on the periphery of society and making up a huge proportion of the population, have proven to be unfavourable (life expectation 10-15 years less than the rest of the residents at that time) (Kiss, 1993). And because the social and economic processes of recent decades have not favoured these social groups, it is unlikely that their state of health has improved substantially either.

All these together confirm the hypothesis that huge divergences in the state of health of the population are not observed in regional differences, but much more as a result of social conditions (Miltényi, 1991). In other words, it is not so much the geographical location of the place of residence which is "decisive" in the state of health, but the position occupied in society, in the social hierarchy, and social status is important. In consequence, the biggest break is not located in space, but between the various

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social strata, i.e. social inequality is (or can be) more important than regional inequality.

The regional differences in the healthcare system may be marked, for example, by the number of residents per general practitioner or per pharmacy. The chance of access to healthcare services depends on the place of residence, more precisely on its size, or on the conditions in the settlement (Uzzoli et al., 2011). In general, there are several kinds of healthcare institution providing a higher level of service in settlements with larger numbers of residents. There are striking differences in the quality of healthcare institutions and healthcare services between villages and towns, and not only in Hungary, but also abroad (Botan, 2011; Platon and Constantinescu, 2013). Bad transport connections and frequently too long journey times may likewise be blamed for the inequalities in healthcare (Makara, 1997). During the last decades the number of residents per general practitioner and pharmacy has decreased in Hungary, but their regional differences have hardly changed. Generally the healthcare services are the best in Baranya and Somogy counties and the worst in Pest and Fejér counties, because in the latter counties there are more than 2,000 patients per general practitioner and more than 4,000 residents per pharmacy.

Taken as a whole, the state of health is determined by the interaction of many factors in general and by individuals too. These factors which can be classified as internal (inherited and acquired characteristics) and external ones can have direct or indirect impacts. There are considerable differences in the spatial distribution of these indicators determining health inequalities in Hungary and their spatial differences.

Regional differences in the light of a few indicators

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Life expectancy at birth

In Hungary the average life expectancy at birth has improved greatly since 1990 and in 2014 it had reached 75.6 years, whilst at the turn of the millennium it was just 71 years. These values even fall behind those of the EU-28 average by a good few years (e.g. by 5.3 years in 2014). The differences in life expectancy between the sexes have decreased in recent decades. Life expectancy for men is now 7 years less on average, whereas in 2000 it was 8.3 years lower than for women. For men, the average life expectancy at birth leapt from 65 to 72 years between 1990 and 2014, and for women from 74 to 79. At the same time, the areas which still have the worst life expectancy became strong concentrated regionally for both sexes (Figure 2 and 3).

Life expectancy for men in 1990 was the highest (66.8 years) in Győr-Moson-Sopron county and the lowest (63.8 years) in Szabolcs-Szatmár-Bereg county. In 2014, however, Budapest (74.1 years) and Borsod-Abaúj-Zemplén (in short BAZ) county (69.7 years) represented the two extreme values, the difference between these exceeding 4.4 years. For women the difference was 2.7 years at the earlier date, as in Komárom-Esztergom county life expectancy was 72.5 years and it was 75.2 in Heves county. A quarter of a century later, however, the difference between the two extreme values (Budapest 80 years, Békés county 77.6 years) was just 2.4 years. Thus the regional differences in life expectancy for women lessened, but those for men increased. Life prospects for men are the most unfavourable in Borsod, Szabolcs and

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Figure 2. Life expectancy of men at birth by county in Hungary

Source : The volume of census, 1990-2011 & Regional Statistical Yearbooks, 2001-2014

Komárom. Furthermore, the position of these counties is persistently bad in this regard. Of these, the situation of the men of Komárom-Esztergom county is the most surprising, because in the northern half of Transdanubia

Figure 3. Life expectancy of men at birth by county in Hungary

Source : The volume of census, 1990-2011 & Regional Statistical Yearbooks, 2001-2014

the health indicators are better for the most part. Compared with the earlier period, Pest, Bács-Kiskun and Tolna counties have managed to exit the group of areas with the lowest life expectancy, because the life prospects for men

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have improved there. Representatives of the stronger sex can count on the longest life in the capital city, which is followed by Gyor-Moson-Sopron and Veszprém, which have retained their earlier favourable position.

As in the case of the men, a high degree of regional homogenisation can be observed in the life prospects of women, because by 2014 in a considerable proportion of the country the average age at death rose above 78 years, whilst in Budapest it exceeded 80. The areas with the worst life prospects had shrunk to a few counties by 2014, as if forming a connected band starting from Nógrád and Borsod counties through Jász-Nagykun-Szolnok to Békés county. In each of these counties, with the exception of Békés, life prospects for women were already worse in the 1990s. Those living here could reckon on a shorter life. The reasons why no substantial change has occurred even by today are very complex. The prominently good life expectancy of Budapest residents confirm the conclusion that life prospects are also favourably influenced by the size of a settlement, because the more populous a settlement is, the longer the life expectancy, and the period of sickness is shorter (Faragó, 2007). According to the latest data the Hungarians spend approximately ten years less in health than do the residents of developed countries.

Mortality by chief causes of death

The number of deaths per one hundred thousand residents fell from 1,441 to 1,245 between 1992 and 2014. The extent of the reduction was only a hair's breadth greater after the turn of the millennium than it was in decade of the 1990s. The regional differences also became sharper after the change in regime, presumably due to the acceleration of



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Figure 4. The number of deaths per hundred thousand residents by county in Hungary

Source: Demographic Yearbooks of Hungary, 1990-2014 & Regional Statistical Yearbooks, 1990-2014.

differentiated social-economic development (Figure 4).

The number of areas with the highest death rate shrank, and those with the low death rate broadened. The counties representing the Eva Kiss

extreme values also changed. In 1992 Somogy county was in the lead with 1,563 in the number of deaths per hundred thousand residents, and Fejér county was in the rear with 1,266. In 2014, however, Pest county came to the fore with "only" 1,081 mortalities per one hundred thousand. This can be explained by the youthful population in consequence of suburbanisation, which is also indicated by the fact that the aging index in 2014 was just 94, whereas the national average reached to117. At the same time, the largest number of mortalities (1,504) was registered in Nógrád county, which may be attributed to the very unfavourable social and economic situation (e.g. high unemployment mainly among men) in the county. For example, the aging index of the county is very high (134 in 2014). And the GDP per capita has been one of the lowest in the country for decades, as has the proportion of college and university graduates. The former fell short of the national average by 38% in 1994 and by 42% in 2012, as did the latter by 34% in 1990 and 40% in 2011.

There has been no striking realignment in the distribution of mortality by county, although the number of areas with a low death rate has increased. Not counting Gyor-Moson-Sopron, Fejér, Pest, Hajdú-Bihar and Szabolcs-Szatmár-Bereg counties, or the capital city, the death rate is high everywhere. For an extended time, chiefly the inhabitants of Nógrád and Békés counties have been in a much worse situation than in other areas of the country, and Győr-Moson-Sopron, Fejér and Hajdú-Bihar counties residents have been much better off. The example of the last three counties also confirms the fact that their persistent advantage is due to other factors besides the degree of economic and social development.

The mortality data also point to the most frequent diseases which end in death. In Hungary as in western lands, the leading causes of death are cardiac and vascular diseases, which besides hereditary factors may have numerous other causes (improper nutrition, lack of exercise, health-damaging habits, etc.) (Kiss, 2005). Half of all mortalities are due to cardiac and vascular diseases, i.e. behind one of two deaths are sicknesses of this type. Although the number of mortalities of this nature per one hundred thousand residents dwindled sharply from 739 to 636 between 1992 and 2014, the regional differences increased and their spatial occurrence also altered. Mortalities caused by the circulatory system show a high degree of similarity, pre-eminently to the spatial distribution of the number of deaths per hundred thousand residents up till the turn of the millennium, which may be attributed to the fact that the bulk of mortalities comprise those arising from circulatory diseases, so their effect is also reflected regionally. Since 2000, the extent of the areas with the highest death rates has shrunk (Figure 5).

In 1992, mortality was the highest in bands running in a north-southeast direction from Nógrád county through Heves and Jász-Nagykun-Szolnok counties to Békés county, and in a southeast-west direction from Békés county through Csongrád, Bács-Kiskun, Tolna and Zala Counties to Vas county. Twenty years later, of the above "zones", mortality continues to be high in the N-SE band, indeed, in Jász-Nagykun-Szolnok it has increased and Borsod county has also joined this "zone." In contrast, mortality has fallen in the "SE-W "zone". In the formerly continuous band, mortality is now major only in "patches". The number of deaths related to the circulatory system has always



social and economic changes, the ethnic composition of the population, deteriorating living conditions, impoverishment, high unemployment, etc. At the same time Fejér county, which has always had low circulatory mortality over recent decades, had been joined by other regional units (Budapest, Pest, Hajdú-Bihar, Szabolcs-Szatmár-Bereg and Baranya counties) by 2014. The centre of gravity has thus been relocated to the central section of the country and the Northern Great Plain. Better socio-economic factors, as well as more favourable living conditions, and the prevalence of a more health-conscious lifestyle and nutrition have all played a role in this.

More than one quarter of mortalities result from neoplastic diseases, which are in second place as cause of death both in Hungary and in the European Union (Kiss, 2005; Uzzoli, 2003). Among the member states, this index of ours is still one of the worst today. The number of mortalities from neoplastic diseases per one hundred thousand residents increased in the 1990s, but it has stagnated at a high level since the turn of the millennium. In 2014 its value was 332, whereas it was just 317 in 1992. Concurrently with this, regional differences are levelling off, but in a negative direction, because the value of the indicator has become higher in several counties (Figure 6).

Figure 5. The number of deaths per hundred thousand residents caused by the diseases of the circulatory system by county in Hungary

Source: Demographic Yearbooks of Hungary, 1990-2014 & Regional Statistical Yearbooks, 1990-2014

been prominent in Békés and Nógrád counties, which is best explicable by the unfavourable In 1992, mortalities caused by tumours reached the highest value (379) in Budapest, which was followed by Heves (353), Békés (344), Jász-Nagykun-Szolnok (344) and Nógrád (332) counties, as if forming a continuous zone from north to south-southeast. On the other hand, the least numbers died in Veszprém (255), Szabolcs-Szatmár-Bereg (260) and Fejér (271) because of some kind of tumour. The prominent position in death from tumours

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Figure 6. The number of deaths per hundred thousand residents caused by neoplastic diseases by county in Hungary

Source: Demographic Yearbooks of Hungary, 1990-2014 & Regional Statistical Yearbooks, 1990-2014.

occupied by the "band" extending from Nógrád County to Békés county had not altered by 2014. Mortality from cancer further increased in the counties which previously had

unfavourable indices, whilst also expanding more spatially, because newer zones were formed in Transdanubia from Komárom-Esztergom county in the direction of Zala county, as well as from Vas county to Baranya county, along the national boundary. It appears that the outline of a more recent zone with significant mortality from cancer is developing here. As to what may be the cause of this, we can only rely on suppositions. For instance, the economic position of a few counties developed unfavourably after 1989, such as southern Transdanubia was one of the losers in industrial transformation, and that there are significant numbers of Romani people in the population (Kiss 2010; Kocsis 2011).

Although the mortalities from neoplastic diseases per hundred thousand residents in Budapest have been falling constantly since the change in regime, the lowest number of such deaths per hundred thousand residents in 2014 was in Szabolcs-Szatmár-Bereg county, it has managed to retain this illustrious position throughout recent decades. Essentially, this is where the least number of people have died as a result of cancer, the background causes of which would be worth studying more thoroughly, because this could provide a guideline to reducing mortalities caused by cancer in other counties too. As this part of the country has never been one of the most developed regions, and as the number of cancer deaths has likewise risen in the socially and economically more developed sections of the country over the last twenty years, it can be emphatically stated that social and economic development in itself is not sufficient, and other factors are also necessary in order to reduce cancer mortalities. Assessment of the spatial development of tumour deaths may be further





Figure 7. The number of deaths per hundred thousand residents caused by the diseases of the respiratory system by county in Hungary

Source: Demographic Yearbooks of Hungary, 1990-2014 & Regional Statistical Yearbooks, 1990-2014.

modified by the fact that the role of the various types of tumour and the regional distribution are more or less diverse (Kiss et al., 2003).

Of the other causes of death, which amount to a few percent (2-6) of mortalities, those traceable to diseases of the respiratory system are worth mentioning. The number of these discuses per hundred thousand residents is still increasing (from 67 to 70 between 1992 and 2014). In 2014, the most deaths due to these diseases occurred in Nógrád (120), Borsod-Abaúj-Zemplén (107) and Jász-Nagykun-Szolnok (98) counties, and the least in Gyõr-Moson-Sopron (44), Hajdú-Bihar (49) and Pest (55) counties (Figure 7).

Concurrently with a rise in environmental pollution, contamination of the air also increases, which may not only result in a proliferation of respiratory complaints (e.g. allergies) in the future, but ultimately may also cause various diseases of the whole system (Antal and Péter, 2016). The most mortalities due to diseases of the respiratory system occur in stable numbers in the north-northeast part of the country and in south-southwest Transdanubia. This spatial structure has really changed in that the number of respiratory deaths has increased in the counties bordering Pest county. Although the regional differences have not increased, the spatial extent of the areas with higher respiratory mortality grew between 1992 and 2014, because deaths caused by diseases of the respiratory system also increased in Jász-Nagykun-Szolnok, Békés and Fejér counties. The value of the index rose particularly intensively (from 52 to 98) in Jász-Nagykun-Szolnok county, which thus attained third place in the county ranking.

Diseases of the digestive system are causing ever less mortalities, which among other things is explicable by greater awareness of proper nutrition and changes in eating habits. It is also possible that due to price increase,

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Figure 8. The number of deaths per hundred thousand residents caused by the diseases of the digestive system by county in Hungary

Source: Demographic Yearbooks of Hungary, 1990-2014 & Regional Statistical Yearbooks, 1990-2014.

the quantity of food consumed has likewise fallen. Over more than twenty years, the national average of mortalities resulting from diseases of the digestive system has fallen by nearly 40 percent, whilst the earlier powerful regional concentration in the central section of the country, along the line of the Danube and in Northern Hungary, has been replaced by a more even distribution (Figure 8).

Regional differences have weakened in Hungary regarding to the mortalities caused by diseases of the digestive system. In 1992, Pest (134), Komárom-Esztergom (131), Bács-Kiskun (129) and Nógrád (128) counties were at the forefront in the number of digestive system deaths per hundred thousand residents, though by 2014 Zala (82) and Borsod-Abaúj-Zemplén (81) counties had taken over the lead. This indicates a drastic shrinking in the extent of the areas with this highly unfavourable index. Of all counties, the number of digestive system mortalities per hundred thousand of the population has been persistently low in Békés and Hajdú-Bihar counties. Clarifying the reasons also requires additional studies in the future. It is also favourable, that the number of areas where digestive system deaths are the lowest at present has been expanded with Győr-Moson-Sopron, Fejér, Nógrád and Szabolcs-Szatmár-Bereg counties since the turn of the millennium, though the improvement is very modest in the field of digestive system mortalities. A shift has, therefore, occurred to the benefit of the areas with a low mortality rate.

It is important to note that a considerable proportion of digestive organ mortalities are due to liver diseases, in particular cirrhosis of the liver, which is basically a result of the excessive consumption of alcohol. Despite the fact that alcohol consumption per capita has fallen to a great extent since the political changes in 1989, Hungary still occupies a "distinguished" position

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among European countries, where we are only overtaken by Eastern European lands for the most part. For instance, the consumption of distilled alcoholic beverage per capita in 2012 was 4.5 litres in Hungary, whereas in Bulgaria it was 7.6 litres, in Russia close to 12.0 litres, but in Austria only 3.6 litres, in Denmark 3.0 litres and in Italy 2.3 litres. The fact that the estimated number of alcoholics in Hungary plummeted by half between 2000 and 2014 probably contributed to the reduction in digestive system mortalities. At present their number is estimated to be around 400 thousand.

Mental health

As an indicator of the quality of mental health, suicides comprise a special group of mortalities (Dzúrová and Dragomirecká, 1997). The number of mortalities per hundred thousand residents as a result of suicide and self-injury is still higher in Hungary (20 in 2014) than in many European countries (e.g. 17 in both France and Poland, 12 in both Slovakia and Germany). The number of suicides in Hungary fell from 4,133 to 1,927 between 1990 and 2014, which represents an enormous improvement. This is also expressed in a fall in their proportion of total mortalities (from 2.8% to 1.7%). Suicide and self-injury can generally be traced to a number of reasons (insecurity, family and personal problems which appear insolvable, unemployment, impoverishment, loss of hope, etc.). And in a final state of distress and despair, people clearly turn to this "solution". It is well known that the counties of the Great Plain, in particular the southern part (including Bács-Kiskun, Békés and Csongrád counties), are traditionally the areas of the country most disposed to suicide and self-injury, which can be correlated with the spatial extent of the

"tanya" lifestyle. ("Tanya" is a special Hungarian settlement type, it is scattered farmsteads.) The spatial distribution of suicides is characterised by a dichotomy, the numbers being higher to the east of the river Tisza (from Szabolcs-Szatmár-Bereg county to csongrád County) and in Bács-Kiskun county, but lower to the west and north of this (Figure 9).

At the beginning of the 1990s there were the least number of suicides per hundred thousand residents in Vas county (19) and the most in Csongrád county (54). A good twenty years later, the extreme values were represented by Vas (11) and Hajdú-Bihar (31) counties, which values indicate positive regional levelling. It appears that the spatial extent of suicides has greatly shrunk in recent decades, by which the special concentration has also altered. The focus has relocated from the Southern Great Plain to the area of Hajdú-Bihar and Békés counties. Besides this "core area", the number of suicides is also considerable at present in other counties of Transtisza and in Bács-Kiskun. The least number of suicides, on the other hand, have been registered in Central Hungary and in Western Transdanubia, which could be due to first and foremost to the more favourable socio-economic environment and better mental wellbeing. The influence of local society and the physical environment of the given location, i.e. the "place", has been acquiring increasing significance since the end of the 20th century in studies dealing with the state of health (Macintyre et al., 2002; Veenstra, 2005).

The state of health of the population is determined not only by physical, bodily health, but also by mental health. The latter does in fact influence the development or cessation of other diseases, so what characterises the







Figure 9. The number of deaths per hundred thousand residents caused by suicide and self-injury by county in Hungary

Source: Demographic Yearbooks of Hungary, 1990-2014 & Regional Statistical Yearbooks, 1990-2014.

population in this regard is by no means a matter of indifference. Studies have confirmed that

Figure 10. The number of persons in psychiatric care per ten thousand residents by county in Hungary.

Source: Demographic Yearbooks of Hungary, 1990-2014 & Regional Statistical Yearbooks, 1990-2014.

where the mood of the population is better, the proportion of those suffering from mental or psychological complaints is lower (Ambru and

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Varsányi, 2011).

In the 21st century, mental problems have been receiving increasing attention in the healthcare service. The number of those struggling with mental and behavioural complaints or disturbances is constantly increasing in Hungary too. In the underdeveloped area of the Middle Tisza Region, even at the time of the change in the system, general practitioners were reporting an increasing number of psychosomatic symptoms in those coming to their surgeries (Kiss, 1993). Of the psychological problems, the one which stands out is depression. Our century can also be regarded as the era of depression and its consequences and other mental diseases will be the greatest problems of public health (Gidai, 2010). According to Kopp's survey, 7.5 percent of the population complained of moderate or severe depression in 1988, and this had increased to 14 percent in 1995 (Kopp, 2003). Since then, this proportion could have increased further. So it is no coincidence that the number of person in psychiatric care per ten thousand of the population has increased over recent decades, extremely vigorously in some places. For instance in Hajdú-Bihar, Jász-Nagykun-Szolnok and Pest counties, their numbers have doubled (Figure 10).

At the beginning of the 1990s, the least number of those in care for each ten thousand of population were registered in Szabolcs-Szatmár-Bereg, Fejér, Borsod-Abaúj-Zemplén and Békés counties. By 2014, however, Bács-Kiskun, Győr-Moson-Sopron and Budapest had come to the fore, which means a considerable special realignment. Whilst at the former time, the number of those in care was higher in Bács-Kiskun (212) and Nógrád (211) counties, at the latter one it was in Zala (365) and Hajdú-Bihar (312) counties. At the same time, the position of Pest, Hajdú-Bihar and Jász-Nagykun-Szolnok counties had deteriorated considerable, as had that of Zala county. Essentially, the outlines of two new zones stand out, one rather more vaguely, being the band from Komárom-Esztergom via Veszprém county to Zala, whilst the band extending from Pest county via Jász-Nagykun-Szolnok to Hajdú-Bihar is more defined, because here the number of those in psychiatric care per ten thousand residents is a good deal higher on average.

Since the change in regime, therefore, the regional differences have sharpened and there has been a spatial extension of mental illnesses. This is also due to the fact that after 1989, partly the political changes and partly the latest economic crisis caused such severe changes in the economic and social position of individuals, as well as their living and working conditions. This has led to a disintegration of the state of mind and of mental equilibrium. With regard to the aging of the population, the continuing unpredictability of economic and social processes, and to uncertainty about the future, it is improbable that the number of psychological illness per ten thousand residents will decrease.

Conclusions

Significant changes have occurred in the state of health of the Hungarian population since the political changes in 1989, the manifestation of which is differentiated spatially. The examination of several major health indicators at three different times and at county level implies that the state of health of the Hungarian population has improved contrarily. On the one hand, it has got better, because the differences between the extreme values of some health Eva Kiss

indicators (e.g. life expectancy at births, mortalities, mortalities caused by diseases of digestive system or by suicides and self-injuries) have decreased. Thus the regional differences have been also lessened. On the other hand, in case of some other indicators (e.g. cardiac and vascular, neoplastic and respiratory diseases) the state of health of the Hungarian population has strongly worsened during the last 25 years, because the number of mortalities caused by these diseases has increased. It is also unfavourable that the number of patients with mental problems has also grown. These unfavourable changes have extended in space too. In other words, the state of health of the Hungarian population has become worse on the larger part on the country's area. On the basis of the analysis of the figures it has also become obvious that the regional differences are persistent and the circle of areas with good or bad health state has also changed, but not to a large degree. It was also confirmed that the disparities in the state of health observed over recent decades are persistently determined by inherited regional differences. In order to clarify precisely how to explain the change in position of individual regional units, or the persistently good or bad state of health in certain areas, further investigation is necessary.

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National Geographical Journal of India, An International Peer-reviewed and refereed Journal of India (NGSI-BHU, ISSN: 0027-9374/2016/1574), vol. 62 (1), March : 21-40

Sustainable Resource Management: What, What For And How?

Ram Bali Singh

As many as 8 goals of The 2030 Agenda, one way or the other, lay emphasis on sustainable management and utilization of resources. The 17 goals of the Agenda use the term 'sustainable' as many as 14 times and the word 'inclusive' 6 times As such the process of resource management needs to ensure sustainability, equity and inclusion. Resource management is a process of decision making regarding the allocation of resources based on survey, planning and implementation activities. It needs to resolve property conflict, development conflict and resource conflict in order to be economically viable, socially equitable and environmentally bearable. The idea of sustainable resource management takes in to consideration the concept of 'needs' and the idea of 'limitations' and emphasizes the need for equity and growth in a long term perspective. National governments and international organizations are actively engaged in developing location specific, cost effective, efficient and eco-friendly technologies of resource utilization, exploration, management and conservation. The paper examines the concept of resource scarcity, availability and abundance, discusses the rationale behind sustainable resource management and outlines an approach to achieve it.

Key Words: Resource scarcity, Techno-utopianism, Post-scarcity society, Resource management, Decision making, Socio-spatial equity, Sustainability, Inclusion, Growth.

Introduction

The British author and philosopher Sir Francis Bacon (1561-1626) once said 'Knowledge is Power'. Since then the phrase has been reiterated time and again by several scholars and administrators. The Austrian-born American management consultant and author Peter F Drucker (1909-2005) remarked, 'Today knowledge has power. It controls access to opportunity and advancement'. Kofi Annan, the former Secretary General of the United Nations, emphasized 'Knowledge is power. Information is liberating. Education is the premise of progress in every society, in every family.'These statements imply that the transformation of knowledge into technology enabling man to utilize a 'neutral stuff' to his own advantage is the essence of resource. Resource economist Erich Walter Zimmermann (1888-1961) expressed the same view more explicitly when he said 'Resources are not, they become.' Resources are not fixed. The meaning

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and value of resources emerge as man estimates their worth and develops the scientific and technological capability to transform the 'neutral stuff' into useful commodities. Since then resources have been seen as a function of human wants and abilities. 'Resources are not, they become' has been the fundamental construct for resource management, environmental policy and sustainability. As shown in the last figure the environment exists as a 'neutral stuff' until it is transformed by man with the help of technology utilizing the available energy into a resource. As technology develops the man's conception and definition of the resource base also changes and more often widens.

Pessimistic, Optimistic and Utopian Ideas

The population-resource relationship was perceived during the last decade of the 18th century in terms of population and means of subsistence.(Malthus,1798). Resource scarcity was then identified as growing population inevitably outrunning the food supplies. The available means of subsistence would necessarily exercise effective control over the size of the population. However, the population has increased many times since then and simultaneously the farm productivity and food production has increased and standard of living has somewhat appreciably improved for an increasing number of people. Scholars have varying ideas regarding the scarcity, availability, adequacy and abundance of resources. Some have visualized 'over shoot' and 'collapse' because of finite resources, careless technology and increasing pressure of population on the 'spaceship earth' while others have put forth the idea of a post-scarcity

economy, an economy of abundance with better future for the mankind 'technoutopianism'. A large group of scholars have full faith in man's ingenuity and his technology and for them a sustainable society is economically feasible and technologically possible subject to change in man's life style and efficiency improvement in resource utilization, recycling and conservation practices. There is a group of scholars who believe that the world population is increasing, resources are becoming scarce and resource utilization, especially fossil fuels, is leading to some undesirable side effects and irreversible damage to the planet earth. Ever since the British economist and demographer T. R. Malthus (1766-1834) put forth his doctrine many scholars have argued on the similar lines. Barnett and Chandler (1963) put the supposition 'In economic terms, the belief seems to be that natural resources are scarce, that the scarcity increased with the passage of time, and that resource scarcity and its aggravation impair levels of living and economic growth' (p.49). The authors of the Limits to Growth (1972) resorted to computer modeling of exponential growth of population and economy with finite resources of the 'spaceship' earth. They used five variablesworld population, industrialization, pollution, food supplies and resource depletion and, changing growth trends in these five variables, considered three scenarios for the global system. Because of the ongoing growth in the human ecological footprint two scenarios visualized 'overshoot and collapse' while the third one saw a 'stabilized world' through wellmanaged 'peak and decline'. The authors of the Limits to Growth: The 30 Year Update (2004) were somewhat more cautious and observed that though overshoot cannot be

sustained without collapse yet man can still reverse some of the damages to the spaceship earth if he takes appropriate measures to reduce inefficiency and waste generation in utilization of resources by technology upgradation and recycling and reuse of resources.

'Global 2000' Report to the President (1980) concluded, 'Environmental, resource and population stresses are intensifying and will increasingly determine the quality of human life on our planet. These stresses are already severe enough to deny many millions of people basic needs of food, shelter, health, and jobs, or any hope for betterment. At the same time, the earth's carrying capacity- the ability of biological systems to provide resources for human needs - is eroding. The trends reflected in the Global 2000 suggest strongly a progressive degradation and impoverishment of the earth's natural resources.' Richard Heinberg (2011) was of the view that humanity has reached a turning point in its economic history. 'The expansionary trajectory of industrial civilization is colliding with nonnegotiable natural limits...need to build a new economy that operates within earth's budget of resources and economy. Promote human and environmental well being rather than expanding GDP'. The pace of resource exploitation and utilization by the resource swallowing technology of the 1960s and 1970s aggravated the problem of resource depletion and scarcity along with environmental degradation. The versatile genius Kenneth E. Boulding (1972) the ecological ballad: wrote Α conservationist's Lament as quoted in Farvar & Milton (1972)

> The world is finite, resources are scarce, Coal is burned and gas exploded,

Wells are dry and air is polluted, Oil is going, ores depleted, Land is sinking, seas are rising, Fire will rage with man to fan it, People breed like fertile rabbits, Things are bad and will be worse, Forests cut, and soil eroded Dust is blowing, trees uprooted, Drains receive what is excreted, Man is far more enterprising' Soon we'll have a plundered planet, People have disgusting habits. Moral: The evolutionary plan went astray by evolving Man

There is another group of scholars who tend to be optimistic believing in growth in all forms and in an overt technological determinism. They believe in the idea of a mechanized man triumphant over his environment. The concept of resource scarcity for them is a fallacy because resource quality of a 'neutral stuff' is a function of human knowledge and technology for which there is no limit to advancement. Thomas R. De Gregori (1987) argued, 'The material or physical aspect of resources exists before they become resource....The history of every material is the same. It is one of novel combinations of existing devices and materials in such a fashion as to constitute a new device or a new material or both. This creative process of fashioning the material and non-material stuff of our environment in a form usable and serviceable to human beings is determined by science and technology.' Meadows and his colleagues (1992) using their system dynamics computer model and by varying the basic global policy assumptions were able to show a range of outcomes from collapse to sustainability. A sustainable society is economically and

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technically feasible provided growth in material consumption and population must be eased down and simultaneously there is rapid and drastic increase in the efficiency of material and energy use. 'The transition to a sustainable society must be made by carefully balancing our long and short term goals and emphasizing equity and quality of life. It will require honesty, compassion and maturity.' India 2020: A Vision for the New Millennium (1998) sought transforming India into a developed country. Using natural resources and talented man power India can double the growth rate of GDP and realize the vision of a developed India.

The Resourceful Earth: A Response to 'Global 2000' (1984) concluded on an optimistic note, 'Environmental, resource and population stresses are diminishing, and with the passage of time will have less influence than now upon the quality of human life on our planet. These stresses have in the past always caused many people to suffer from lack of food, shelter, health and jobs, but the trend is toward less rather than more of such sufferings. Because of increases in knowledge the earth's "carrying capacity" has been increasing throughout the decades and centuries and millennia to such an extent that the term "carrying capacity" has by now no useful meaning. These trends strongly suggest a progressive improvement and enrichment of the earth's natural resource base, and of mankind's lot on earth.' 2052 : A Global Forecast for the Next Forty Years (2012) explored how the economies, energy supplies, material resources, climate, food, fisheries, militaries, political divisions, cities and mental and emotional life will take shape in coming decades and expressed an optimistic view that there will be increased focus on human wellbeing rather than on per capita GDP growth and quite impressive advances in resource exploration, exploitation and utilization efficiency. It is pertinent to quote once again a ballad by Kenneth E. Boulding : **The Technologist's Reply** as quoted in Farvar & Milton (1972) :

Man's potential is terrific, The cream is there for us to skim it, Every mouth has hands to feed it, All we need is found in granite, Yeast and algae give us meat, Man can go to pastures greener, You cannot go back to the Neolithic, Knowledge is power and sky is the limit, Food is found when people need it, Once we have the men to plan it, Soil is almost obsolete, Till all the earth is Pasadena.

Moral : Man's a nuisance, Man's a crackpot, But only Man can hit the Jackpot

Some of the scholars seem to be too optimistic about the progress of economy, society and technology and in the present socioeconomic and technological context their ideas seem to be somewhat Utopian. These scholars visualize a post-scarcity economy or an economy of abundance, 'A form of economy or society in which goods, services and information are universally accessible on condition of fulfilling one's social obligation to maintain the economy.' This would require a much developed system of recycling and reuse as well as technologically advanced automated system of production. Philip Sadler in his book Sustainable Growth in a Post-Scarcity World (2010) examined the coming of the postscarcity society, sustainability, the poverty trap, the response of business and system change and noted the big global shift from scarcity to abundance - the post-scarcity economy and

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its critical implications for sustainability of the planet and relief of poverty. Diamendis and Kotter (2012) observed ' a future where nine billion people have access to clean water, food, energy, health care, education and everything else that is necessary for a First World standard of living, thanks to technological innovation (Techno-utopianism)...Technologies are improving at an exponential rate and will soon enable breakthroughs that seem to day impossible.' L. Graham Smith of Canada wrote in his blog (Jan.19, 2011) under the title Ecomyths, 'Limits do not exist... Intergenerational equity is a fallacy...Most appeals for conservation are unwarranted... Our guiding premise ought to be how do we develop more cheap power in more places in a decentralized non-polluting manner? Technology has continued to advance, become cheaper, smaller, more effective, more efficient and more equitable under contemporary globalization.' Aquilar-Millan and others (2009) argue that the world between 2010 and 2050 is likely to be characterized by scarcities and there is need to understand the nature of these scarcities and their causes and cures. However, it is unlikely to herald the end of the world. On the basis of an analysis of the post-scarcity company, post-scarcity society, post-scarcity geopolitics and post scarcity financial system they concluded that the world between 2050-75 will not be a world without scarcity but one that has learned to cope with constricted resources. It will imply change in man's life style, a change in quality of growth, a move towards an inclusive society and transformation of technology. This will add to the availability of resources required for man's progress and his well being for a much longer period.

Why Resource Management?

The ideas discussed above seem to vary in their details however, they underscore the need to promote judicious use of resources by advancement of more effective and efficient technology of resource use, exploration, exploitation, transportation and utilization and by change in life style. It will ensure not only socio-spatial equity but intergenerational equity in resource availability and use as well. The existing global pattern of resource utilization is neither equal nor sustainable. We need to manage resources in order to promote a rational pattern of resource utilization accommodating the present trends and future demands of more developed regions (MDRs), less developed regions (LDRs) and less developed countries (LDCs). A growing population, increasing level of urbanization as well as rising income levels and a higher rate of urbanization in less developed regions will put additional demand for resources. The principle of social justice and equity will necessitate proportionately higher rate of growth in per capita resource consumption in developing countries in order to narrow down the gap between the more developed regions and the less developed regions. Annual rate of change in total population was 1.15 percent for the world (2010-15) while it was 1.33 percent for LDRs and as high as 2.28 percent for least-developed countries and 2.46 percent for Africa. Annual growth rate of urban population was 2.05 percent for the world (2010-15)) while it was 2.56 percent for LDRs and 3.97 percent for the LDCs and 3.55 percent for the continent of Africa. The developing countries are urbanizing very fast though their level of urbanization is significantly lower than the developed industrialized nations. About 54.0 per cent of the world population was urban in

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Regions	Total Population 2010-15	Urban Population 2010-15	Per Cent Urban 2015
World	1.15	2.05	54.0
More Developed Regions	0.30	0.60	78.3
Less Developed Regions	1.33	2.56	49.0
Least Developed Countries	2.28	3.97	31.4
Less Developed Regions ex LDCs	1.16	2.41	52.2
Less Developed Regions ex China	1.56	2.41	46.8
Africa	2.46	3.55	40.4
Asia	1.03	2.70	48.2
Europe	0.08	0.50	73.6
Latin America & the Caribbean	1.11	1.45	79.8
North America	0.83	1.04	81.6
Oceania	1.42	1.44	70.8

Table 1: Annual Rate of Change And Urbanization Level

Source: UN, World Urbanization Prospects, The 2014 Revision

2015 while it was 78.3 percent in MDRs, 49.0 percent in LDRs and only 31.4 percent in the LDCs. Asia was 48.2 percent urban while Africa was only 40.4 percent urban. These three population factors together will generate huge demand in LDRs for additional resources in coming decades (Table.1).

It is universally accepted that resource consumption per capita of population having higher per capita income level is generally higher than the one with lower per capita income level. As income rises the level of resource consumption also rises. As is evident from the table (Table.2) the industrialized developed nations had quite high GNI/person than the developing countries in 2014. Income per capita of Norway was more than 187 times higher than the per capita income of Ethiopia, about 64 times higher than the per capita income of India and about 14 times higher than the per capita income of China in 2014. In case it is assumed that developing countries will achieve an income level equal to that of a developing country like Brazil (\$11,800/person) and some of them equal to China (\$7,400/person) within two to three decades there will be huge demand for additional resources at the global level more so in less developed regions. The demand for additional resources will be quite high in densely populated developing countries like China, India, Pakistan, Indonesia, Bangladesh, Nigeria, Egypt and many countries in Africa.

The energy consumption at the world level was 19422 kwh/ person in 1990 and it increased to 21283 kwh/person in 2008 (Table 3) The per capita energy consumption of industrialized developed countries (USA & EU 27) was higher than the world average and much more higher than India, China, and other countries in Asia, Africa and Latin America.. The latter claim about 80 percent of the total population of the world. There has been

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Countries	GNI	Countries	GNI	Countries	GNI
Norway	103050	United Kingdom	42690	India	1610
Switzerland	90670	Brazil	11760	Pakistan	1410
Australia	64680	China	7380	Bangladesh	1080
United States	52000	Indonesia	3650	Afghanistan	680
Japan	42000	Egypt	3280	Uganda	660
Germany	47640	Sri Lanka	3400	Ethiopia	550
France	43080	Nigeria	2950	Congo Dem Republic	410

Table 2 : GNI/Person, 2014 (Current US \$)

Source: The World Bank Data, data.worldbank.org/indicator/GDP/NY.GNP.PCAP/CD

Regions/Countries Energy Use Energy Use Population (Million) 1990 2008 2008 87,216 United States 89.021 305 E U 27 499 40,240 40,821 Middle East 19,422 34,774 199 China 8.839 18,608 1,333 Latin America 11,281 14,421 462 Africa 7,792 964 7,094 India 4,419 6,280 1,140 Others 25,217 23,871 1,766 6,688 World 19.422 21,283

Table 3: Population And Regional Energy Use (Kwh/PERSON)

Source: IEA/OECD; Population OECD/World Bank

consistent demand to narrow down this gap in per capita energy consumption as well as consumption of other resources between the MDRs, the LDRs and the LDCs. This will put additional demand for energy resources in LDRs and much more in less developed countries (LDCs). Simultaneously the developed countries will try to maintain, if not to increase, their existing resource consumption level. It is heartening to note that there has been decline in per capita energy consumption in United States and a very marginal increase in

countries of the European Union.

The data pertaining to energy use in some selected countries give an idea of emerging energy demand scenario in somewhat more detail. The energy use per capita has consistently declined in the United Kingdom and Germany and has declined during 2005-12 in Canada and the United States (Table.4) The energy use has increased very marginally (1.4 percent) in Australia during 2005-12. These countries have resorted to more efficient and relatively clean technology, conservation and

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Countries	Energy use			Countries	Energy use		
	1995	2005	2012		1995	2005	2012
Canada	7862	8379	7226	Indonesia	674	801	870
United States	7764	7846	6815	Nigeria	680	754	792
Australia	5129	5564	5644	India	402	479	637
Germany	4118	4084	3886	Sri Lanka	331	458	554
United Kingdom	3728	3686	3018	Ethiopia	437	442	496
China	867	1362	2143	Pakistan	423	483	479
Mexico	1362	1523	1559	Kenya	442	452	476
Brazil	995	1157	1418	Congo D.R.	306	309	313
Egypt	576	858	969	Bangladesh	133	159	214

 Table 4: Energy Use In Some Selected Countries (Kg of oil equivalent per capita)

Source: data.worldbank.org/indicator/EGUSE.PCAP.KG.OE

recycling, development of nonconventional renewable sources of energy and stringent measures to maintain the quality of environment and to preserve the carrying capacity of the ecological system and simultaneously have maintained the higher level of their GDP per capita. On the other hand there has been significant increase in energy consumption per capita in the developing countries except a very marginal decline in energy consumption per capita in Pakistan during 2005-12. There has been an alarming increase in energy use per capita in China (150 percent) and quite substantial in Egypt (68 percent), Bangladesh (61 percent), India (59 per cent), Brazil (44 percent) and Indonesia (29 percent). Even after this substantial increase in energy use per capita in these developing countries during 2005-12 the energy use per capita in Canada was as high as 33 times of energy use per capita in Bangladesh, more than 11 times of India, more than 8 times of Indonesia, more than 7 times of Egypt, more than 5 times of Brazil and more than 3 times of energy use per capita in China. The energy consumption is likely to increase

further in many more developing countries as they plan to initiate the process of industrialization and accelerate the pace of economic development.

Water is an essential resource for man's survival and his economic pursuits. Global demand for water has grown rapidly, at 2.4 percent per year since 1970. Water scarcity, though region and season specific, has become quite serious in some of the developing countries. Water shortages are likely to increase dramatically and by 2025 some 46 to 52 countries with a total population of around 3 billion will be water stressed (Engelman and LeRoy,1993). The per capita annual fresh water withdrawals in more developed regions is much more higher than the less developed regions though the former are located in temperate region. Agriculture accounts for about 70 percent of water withdrawals worldwide and more than 90 percent of water withdrawals in low income developing countries (Table.5). Annual water withdrawal in high income countries was more than 3 times of the low income countries and more than 2.5 times

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Country income	Withdrawal	Withdrawal by sectors (Percent)		
group	M3/per capita	Agriculture	Industry	Domestic
Lowincome	386	91	5	4
Middle income	453	69	18	13
High income	1167	39	47	14

Table 5 : Annual Water Withdrawal By Country Income Group

Source: World Bank, (1992)

of the middle income countries (World Bank, 1992). As the low income and middle income countries accelerate the pace of their economic development their annual water withdrawals per capita will increase substantially. As incomes grow in low income and middle income countries there will be significant increase in the demand for direct allocation of water for environmental, sports and recreation purposes e.g. preservation of wild and scenic rivers and lakes, protection of endangered fish and wildlife species, prevention of salt water intrusion, and water sports, recreation and amusement parks. Agriculture, industry and domestic sectors will generate huge additional demand for water in less developed countries. (Rosegrant, 1997).

Water use efficiency in agriculture as well as urban sector is quite low in developing countries. Overall irrigation efficiencies range from 25-40 percent in India, Mexico, Pakistan, Philippines and Thailand to 40-45 percent in Malaysia and Morocco compared with 50-60 percent in Israel, Japan and Taiwan (Rosegrant and Shetty,1994), The recent data available shows that there has not been any significant improvement in irrigation efficiency in India. It is barely 35 percent. About half of the irrigation water is lost to leakage, over irrigation and system inefficiencies. Only one out of 6 farmers is aware of irrigation efficiency technologies. It is thus evident that very large savings in water use can be obtained in irrigation sector alone in developing countries. The amount of unaccounted-for water (water wasted and lost in urban distribution system) is often huge in developing countries. In Manila in 1955 only 42 percent of water supplied was actually sold to users. Baranquilla (Colombia), Cairo (Egypt), Jakarta (Indonesia), Lima (Peru) and Mexico City (Mexico) have unaccounted-for water levels as high as 60 percent compared with 10-15 percent in well managed water supply systems. In Jakarta water loss through leakage has been estimated at 41 percent. The developing countries need to improve their technology of resource use and need to resort to recycling, reuse and multiple uses of their resources. The industrial output in Japan was \$ 21/per cubic m of water use in 1965 and it increased to \$77 for the same amount of water use in 1989. In United States during 1950-90 the industrial output increased nearly four times while the water use declined by 36 per cent. In India the efficiency level in energy sector is quite low in generation, transmission and distribution of electricity. The national average of PLF was 65.56 percent in 2012-13 across the three sectors. It varied from 53.81 percent in Uttar Pradesh to 85.03 percent in Andhra Pradesh. The PLF for the National Thermal Power Corporation (NTPC) was 82.22 percent in the same year. The NTPC achieved 86.34 percent PLF on 27 August 2015. The PLF for the private sector plants was 100.04 percent in the year 2012-13.(Power and Energy Division, Planning Commission, 2012-13). The transmission and distribution loss reported by some of the State Electricity Distribution Corporations is unusually very high. It is pertinent to mention here that even one percent improvement in the PLF across three sectors will result in about 2.5 billion units of additional power generation.

World Watch Institute (2013) expressed the view that consumption of goods and services has been rising steadily in industrial nations for decades and it is growing rapidly in many developing countries. 'If the levels of consumption that the most affluent people enjoy today were replicated across even half of the roughly 9 billion people projected to be on this planet in 2050, the impact on our water supply, air quality, forests, climate, bio-diversity and human health would be serious'. The process of resource management needs to take these factors into consideration and plan for resources supply on a sustainable basis.

Resource Analysis, Development and Management

Scholars have been engaged in discussing the location related attributes, general characteristics and pattern of utilization of resources, in examining the process of their allocation and in evaluating impacts of alternative pattern of resource allocation on the environment, the economy and the society. Resource analysis may be defined, 'as the process which seeks to understand the fundamental characteristics of natural resources and the process through which these are allocated and utilized'(Bruce Mitchell, 1979). Geographers have been active in the field of resource analysis and one can identify four types of studies: 1.surveying, mapping and measurement of resources supply and demand, their characteristics and properties; 2.analysis of spatial, temporal and functional allocation of resources; 3.examining variables which influence the resource development or resource allocation; and 4.studying the impact of resource allocation. However, the actual allocation of resources lies in the domain of Resource Management. Land use survey of Britain completed under the supervision of L. Dudley Stamp (1962) is an excellent example of a geographical approach towards land resource survey and analysis. Some of the Discussion Papers in the field of Food, Agriculture and the Environment published by the International Food Policy Research Institute (IFPRI) examine the supply and demand of resources in different regions and outline strategies for managing future demand and supply of the resources. Food and Agriculture Organization (FAO, Rome) has been engaged in developing a general framework for land and soil resource analysis and evaluation and land use planning. Commonwealth Scientific and Industrial Research Organization (CSIRO, Australia) started land resource surveys in 1946 just after the World War II. The final report was published in 1977. It was a soil and land resource survey and analysis done by the multidisciplinary teams using conventional methods of field survey as well as interpretation of aerial photographs. Kozlov and Pominov (1987) presented an analysis of availability, utilization and conservation of energy resources, conventional as well as nonconventional renewable, in the

developed, developing and socialist countries. The authors stressed the need for close international cooperation in overcoming the energy problem and its impact on environment and quality of life. Resource development is essentially a technical and engineering activity aimed at actual exploitation and utilization of any particular resource or all the resources of an area in an integrated manner. The resource development process transforms the 'neutral stuff' in to a commodity or service to serve human needs and aspirations. The Rihand dam built across the river Rihand to utilize the water collected in Govind Ballabh Pant Sagar to produce 300MW of electricity and to irrigate about 2.5 lakh ha of land along with other benefits may be cited as a process of resource development. Building the Indira Gandhi canal project with two barrages, 32 km. long feeder canal, about 649 km long main canal and about 8,000 km long distributaries along with other irrigation channels is a case of water resource development for irrigation purposes. Improving the quality of a resource is also an activity of resource development. Establishment of coal washeries to produce high grade coking coal from low grade coal may be cited as an example of resource development process. Use of geospatial technology during various phases of resource analysis and resource development has proved quite beneficial. Resource analysis and resource development provide valuable input to the process of resource management.

Resource management is a continuous, multidisciplinary and problem oriented activity of decision making regarding the actual allocation of resources. *'Resource* management may be defined as a process of decision making where by resources are allocated over space and time according to the needs, aspirations and desires of man within the framework of his technological inventiveness, his political and social institution and his legal and administrative arrangement'.(O'Riordan, 1971) The term sustainable lays emphasis on the need of a system view of the process and a long term perspective (intergenerational) on equity, growth and environmental improvement. The process of resource allocation takes into consideration the regional variations in level of economic development and the prioritization and phasing of programs and projects. It aims to satisfy the needs, aspirations and desires of the community in general and of the weaker sections in particular in that sequence. A decision regarding the allocation of resources is made taking into consideration the level of technology and foreseeable changes in it, the system of governance, the social institutions and the administrative frame work. As most of these elements are likely to vary from society to society hence the process of resource management will generally be society specific though there might be some universal elements and factors in the process. The process of resource management may consist of four phases :

 μ Identification of a significant problem;

 $_{\mu}$ Formulation of a policy to solve the problem- a political decision;

 $_{\mu}$ Implementation of policy by committing resources; and

 $_{\mu}$ Monitoring the progress and evaluating the impact of the policy.

The contributions of geographers have more often been in identifying the problem for which either there is no policy or the existing policy is inadequate and in monitoring the progress and evaluating the impact.

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The process of policy formulation and decision making for resource management consists of four activities- Survey, Planning, Decision Making and Implementation – which remain closely interlinked through feedback and feed forward linkages (Fig.1).

Survey is concerned with the study of resource supply, present utilization pattern and impact analysis. Planning consists of identification of goals, objectives and targets, formulation of policies as well as devising means and ways for utilization of resources. Implementation involves institutional arrangement necessary to transform the resource allocation and utilization plan into action. The decision making involves commitment of resources, improving legal infrastructure and administrative framework and taking measures to make the plan implementable.

Indian Initiatives Toward Resource Management

During 1980s Government of India initiated some technology based programs to support local level planning activities. Natural Resource Data Management System

(NRDMS) of the Department of Science and Technology, National Natural Resources Management System (NNRMS) of the Department of Space and the Geographical Information System (GISNIC) and the District Informatics Program (DISNIC) of the Ministry of Communication and Information Technology are some of these programs. Using state-ofthe-art technology, specially the geospatial technology, their functions include resource data capture and information generation, resource data base management, preparation of natural resource inventory and provide input in decision making. NRDMS, launched in 1982, sought the involvement of state governments, research and development (R & D) institutions, universities and NGOs in the development and demonstration of spatial data management techniques for area specific resource management and development planning using the concepts of GIS. NNRMS which started functioning in 1983 is an infrastructure of distributed GIS data servers linked through high speed network. It supports the optimal utilization of remote sensing and conventional data for management and development of country's natural resources and supports development



Fig. 2: After: www.nnrms.gov.in NNRMS Programs/Overview

needs by generating a proper and systematic inventory of natural resources and provides integrated solutions for their optimal utilization and management. It generates large area data base under Natural Resources Information System (NRIS) and Disaster Management System (DMS) projects. The Natural Resources Repository (NRR) under NNRMS has 3 major elements: 1.data generation, 2.data base organization and 3.spatial data service. The figure (Fig.2) shows the elements of National Natural Resource Management System (NNRMS). Indian Institute of Remote Sensing (IIRS, Dehradun) runs some courses and training programs sponsored by the NNRMS in the field of resource survey, resource evaluation and resource management.

NRDMS was started in 1982 to strengthen the S&T inputs in developing tools and technologies for integrated resource management and for capacity building at various levels of planning and implementation in a spatio-temporal context in a multilevel framework below the district.

GISNIC is designed to provide a complete desktop GIS solution for retrieval, projection, transformation and analysis of both spatial and non-spatial data so that the user is able to manipulate and manage coordinate (locational) and attribute (thematic) data and produce thematic maps and reports. DISNIC was formed in 1987-88 to design, develop and implement the assigned program using NICNET facilities at the district level and to interact with NIC State Units and Regional Centers. Natural Resources Management Division (NRMD) of Indian Council of Agricultural Research (ICAR) was instituted for 'sustainable management of natural resources for achieving food, nutritional,

environmental and livelihood security in the country'. It has been engaged in 'developing location-specific, cost-effective, eco-friendly conservation and management technologies for higher input use efficiency, agricultural productivity and profitability without deteriorating natural resource base'. The Division has identified land, water and soil resources management and conservation, crop diversification, agro-forestry, integrated farming systems and land use planning as its thrust areas. These public sector initiatives have generated natural resources data for various regions and have aroused awareness to manage the resources efficiently and effectively.

The government of India has taken some sector specific initiatives for analysis, development, management and monitoring of particular resources. National Bureau of Soil Survey and Land Use Planning (NBSS&LUP, Nagpur) is one of the National Resource Management (NRM) institutes of the Indian Council of Agriculture Research (ICAR) to conduct research and development activities mainly in soil survey, remote sensing application, land evaluation and land use planning. State Land Use Boards (SLUBs) have been established in almost all the states to prepare inventory of land resources and to promote their rational utilization as well as to share the experiences among them and to ensure transfer of best practices from one state to the other. As regards the water resource sector the National Water Development Agency was established in July 1982 and the National Water Board in September 1990. The Central Water Commission as the apex body has been assigned the task' to promote

integrated and sustainable development and management of India's water resources by using state-of-art technology and competency and coordinating all stake holders'. There is proposal to establish an autonomous body namely National Bureau of Water Use Efficiency (NBWUE) in 2016. The Bureau will ensure efficient utilization and effective regulation of water resource across all the sectors and its conservation.

Indian Council of Forestry Research and Education (ICFRE, Dehradun) with 9 research institutes and 4 advance centers has to ensure 'conservation, protection, regeneration, rehabilitation and sustainable development of natural forest ecosystems'. Bureau of Energy Efficiency (BEE) was created in 2002 by the Ministry of Power ' to develop programs which will increase the conservation and efficient use of energy in India and to measure, monitor and verify energy efficiency results in individual sectors as well as at macro level' The Bureau with its slogan "Energy is life conserve it" supervises the National Mission for Enhanced Energy Efficiency, Energy Audit as well as Standards and Labeling Program. NGOs and certain private sector organizations have contributed in their own way towards efficient utilization and sustainable management of natural resources of the country as well as programs of environmental improvement in specific areas. Big businesses and industrial houses have undertaken programs in areas of resource management and development, resource recycling and reuse, safe water and sanitation, environmental improvement, education, nutrition and health, and social awareness as their corporate social responsibility (CSR).

Sustainable Resource Management

'Sustainability is the capacity of a system to engage in the complexities of continuous improvement consistent with deep values of human purpose' (Michael Fullan, 2004). In this context the concept of sustainability becomes time and space specific as it is consistent with deep values of the society. A sustainable system is one which depends on mix of socio-cultural values, technology and the resource base. It must be interpreted with reference to the society with its surrounding environment, sociocultural milieu and the stage of technological development. A system may be sustainable in one society or region but may not be sustainable in another. Sustainability lays emphasis on two key concepts:

The concept of 'needs' in particular the essential needs of the poor to which overriding priority should be given. 'Earth provides enough to satisfy everyman's needs but not everyman's greed' Mahatma Gandhi ; and

The idea of 'limitations' imposed by the state of technology and social and political organization on the environment's ability to meet present as well as future needs. Meeting the needs of the future depends on how the society balances social, economic and environmental objectives or needs.

Sustainability also emphasizes the need for equity as well as growth with a long term perspective and a system thinking regarding the interconnections between the environment, the economy and the society. The sustainability lies at the centre of the triad-environment, economy and society (Fig.3). In order to promote a sustainable system one needs to resolve *the resource conflict* between the economy and the environment; *the development conflict*

between the equity and environment and *the* property conflict between the equity and the economy. The economic perspective lays emphasis on a higher rate of growth and the maximization of GDP with an objective to collect maximum revenue and thus to add to the economic viability of the local economy. The environmental perspective pleads for judicious use of resources, their recycling and reuse and for avoiding irreparable damage to the carrying capacity of the local ecosystem. Thus it renders the entire ecosystem environmentally bearable. The equity principle accords priority to social, spatial and intergenerational equity with an objective to ensure an equitable, inclusive, just and sustainable society. Transforming Our World: The 2030 Agenda for Sustainable Development unanimously approved by the member states during UN Sustainable Development Summit 2015 in New York outlines 17 goals and the performance of member countries is to be assessed on the basis of 169 targets pertaining to these goals. The Agenda will prove a mile stone in global progress towards inclusive growth, sustainable development and resource management. Its goals include sustainable agriculture, sustainable management of water and sanitation, sustainable energy, sustainable economic growth, sustainable industrialization, sustainable cities and human settlements, sustainable consumption and production, sustainable use of oceanic, seas and marine resources, sustainable use of terrestrial ecosystems and sustainable use of forests and land resources. Thus the Agenda lays emphasis on sustainable management and utilization of resources with an objective to achieve the goal of sustainable and inclusive growth. As shown in the figure a sustainable system is one which

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is socially equitable, economically viable and environmentally bearable. It lies at the centre of the triad – the economy, the environment and the society.

The UN Global Compact Cities Program is of the view that the social life should be holistically understood across an integrated series of four domains (in place of three)economy, ecology, politics and culture. Each of the four domains is further subdivided in to seven pairs of sub-domains and these are to be assessed as vibrant, resilient, livable, satisfactory plus, satisfactory, satisfactory minus, compromised, difficult and critical. The approach which is issue driven provides a way of achieving sustainability and resilience that combines qualitative and quantitative indicators. World Commission on Environment and Development (WCED, 1987). recommended seven critical actions for sustainable development which seem to be equally valid for sustainable resource management. :

å Revive growth;

- å Change the quality of growth;
- å Meet essential needs and aspirations;
- å Ensure sustainable level of population;
- å Conserve and enhance resource base;
- å Reorient technology and manage risk; and
- å Include and combine environmental and economic considerations in decision making.

In 2002 the UN proclaimed the years 2005-2014 as the 'World Decade for Education for Sustainable Resource Management'. As a follow up the Technical University of Munich (Germany) started a four Semester Master of Science Program in Sustainable Resource Management. Though the World Decade is over yet even today the problem of managing natural resources on a sustainable basis has not receded to the back stage. The society must adopt an integrated and interdisciplinary approach combining social, physical and biological aspects of natural resources in order to find sustainable solution to the complex
DETERMINATIONS OF SUSTAINABLE RESOURCE MANAGEMENT





problems of resource management.

It is needless to emphasize that sustainable resource management is to some extent a prerequisite for sustainable development.

Sustainable Resource Management: A Suggested Approach

As shown in the figure (Fig.4) the sustainable resource management needs to integrate 3 Es namely the environment, the energy and the economy. Energy and technology are interdependent and so are the economy and space. Man advances technology and makes use of environmental resources to improve upon his well being and in this process he transforms the economy (resource utilization) and space (social and spatial organization), The physical and cultural processes (a component of environment) usually determine the dynamics and transformation of the resource nexus. The quantum of energy use determines the stage of technological development which, in turn, dictates the spatial manifestation of activities of resources utilization and associated processes and impacts. Policy options, social norms and system of governance are likely to determine the pace and direction of transformation with respect to their own sectors and their interconnections. The environment, the economy and the energy along with technology and space are directly and indirectly interlinked and these are directly linked to the sustainable resource management at the centre. The inclusive and sustainable growth will inter alia depend on sustainable management of resources. The following are the components of the proposed sustainable resource management approach. The components may be modified to suit the local situations.

SE – Sustain ecology and environment

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through resource conservation, recycling and substitution by using alternatives; promote natural resource education and awareness; lower population growth rate; sustainable resource management policies be integrated in development planning strategy.

TT – Transform technology of resource exploitation and utilization making it more efficient; technology transformation be guided by physico-biotic resource base, socio-cultural milieu. the spatio-economic system and the policy options.

LE – Lower energy consumption by changing life style and by ensuring energy efficiency in each sector and at each stage of resource utilization and thus decelerating the energy demand; augment energy supply by developing nonconventional and renewable energy sources. It will ensure access to affordable, reliable, sustainable and modern energy for all as stipulated in goal 7 of the 2030 Agenda.

ME – Maximize employment opportunities by developing and efficiently managing the local resources; encourage rural industrialization and promote SMEs to utilize local labor and local farm produce; facilitate agriculture diversification for full utilization of land and water resources and to provide full and productive employment and decent work for all as outlined in goal 8 of the 2030 Agenda.

NT – Neutralize traps of deprivation in social, political and economic space (poverty, physical weakness, vulnerability, powerlessness, isolation-Robert Chambers, 1983) through effective and inclusive institutions and enhanced access of the poor and marginalized to CPRs and other resources as well as capital and political power; reduce inequality, eradicate poverty and achieve food security to control further degradation of marginal and vulnerable environmental resources.

(T)S – Stimulate trickle down in social, geographical and economic space to reduce inequality and to promote peaceful, healthy and inclusive societies free from hunger and poverty; a rational location policy and better articulation of the spatial system in accordance with regional and extra-regional resource availability and inter regional resource complementarity.

The suggested approach if implemented properly keeping in view the total available resource base; upgradation of technology of resource exploitation and utilization; needs, priorities and aspirations of all the stake holders; social and political space and inter linkages is likely to ensure management of material, energy and human resources on a sustainable basis and promote inclusive and sustainable growth.

Concluding Remarks

A rapidly growing population, increasing level of urbanization, rising income levels, widening disparities in consumption and production levels and clamour for equity and social justice within nations and between nations will generate huge additional demand for resources. Simultaneously there will be social and political pressure to ensure easy and equal access of the poor and the deprived to the resources and opportunities and to the benefits of growth and development in future. In an interconnected and globalized world the impacts of all this on energy sources, water, forest, land, soil, climate, bio-diversity, economic growth and quality of life and human health will be immense. The process of resource management and development needs to take

these factors into consideration and plan for resources supply on a sustainable basis. National governments are alive to problems of utilization and conservation of their resources and have initiated necessary measures. At the international level the UN Sustainable Development Summit (2015), G-20 Antalya Summit (2015) and UN Climate Change Conference (2015) will enable the world community to move closer to the goal of sustainable development and resource management. World community, national governments and civil societies at large are moving in right direction and the sustainability, as the present trends indicate, will no longer remain illusive.

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National Geographical Journal of India, An International Peer-reviewed and refereed Journal of India (NGSI-BHU, ISSN: 0027-9374/2016/1575), vol. 62 (1), March: 41-48

Impact of Flood on Education in Darakeswar-Mundeswari-Interfluve in Hugli District, West Bengal

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Education is an important indicator of human development in any region. However, Educational institutions have been greatly affected due to recurrent flood problems in Darakeswar-Mundeswari Interfluve. In the present paper, an attempt has been made to assess the impact of flood on education keeping in view the physical and socio-economic background of the study area. In addition, some measures have also been suggested for the development of education in such a flood-prone area.

Keywords: Flood, Education, Dropout, Emergency shelter

Introduction

No one can stop natural disaster. However, we can reduce the impact of natural disasters on physical and socio-economic environments. It is notable that victims of disasters mainly are from the least wealthy and living in unsafe houses and engaged in more dangerous activities, and have limited options and entitlements. Generally, children and women are the most vulnerable groups in all disasters but there are no major educational programmes related to disaster risk reduction in primary or secondary schools in Darakeswar-Mundeswari Interfluve. Teaching lessons on Disaster Risk Reduction (DRR) should not only be introduced in schools but also to the community as well. When disaster occurs, this

will in turn help to minimize losses. At the same time investing more in strengthening schoolbuilding structures before disasters take place would help reduce long-term costs, protect women and children, and ensure the continuity of education after their occurrences (IASC, 2008)

Objectives of the Study

The objectives of the present study are: 1. To analyse the status of education in

the study area.

2. To analyse the impact of flood on education.

3. To suggest appropriate measures for the development of education.

Study Area

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Fig. 1

The study area is Darakeswar-Mundeswari interfluve in Hugli District of West Bengal. It is situated in the south- western part of the district. The study area (73N / 13 & 73N /14 in SOI Topographical Map) lies between the latitudes 22°362 153 N to 22° 572 353 N and 87°452 003 E to 87° 582 103 E longitudes (Fig. 1). Geologically the study area is covered by alluvium, brought down by the River Darakeswar and Mundeswari (Roy Chowdhury, 1973). From the topographic point of view, this study area is purely an alluvial tract having plain surface with very low slope. The slope of the area is from North to South.

The main rivers of this area are Mundeswari, Darakeswar, Kana-Darakeswar, Rupnarayan and Harinakhali. The nature of this river is non-perennial. The area enjoys subtropical climate with three distinct seasons: (i) Summer, (ii) Monsoon and (iii) Winter. The average temperature is 26.8°C and its monthly temperature range from 16° to 33°C and maximum temperature often exceed 38°C. Most of the rainfall (80 %) occurs due to Impact of Flood on Education in Darakeswar-Mundeswari-Interfluve in Hugli District. 43

Table 1: Status of Education in Darakeswar-Mundeswari Interfluve

Block	Literates (%)	Illiterates (%)
Khanakul-I	69.9	30.1
Khanakul-II	70.5	29.5
Arambagh	71.0	29.0
Arambagh(N	A) 74.2	25.8
Pursurah	75.1	24.9



Fig. 2

summer monsoon (June to August). The average yearly rainfall is 1500 mm. The study area is a highly rich agricultural and densely populated region as it has fertile loamy soil (Majumdar, 1978).

Database and Methodology

Both primary and secondary data are used in the present study. Secondary data are collected from Sub-divisional Disaster Management Department, Arambagh, Hugli and School Education Department, topographical map (73N/13 & 73N/14) from Survey of India. The primary data are collected through in-depth Interview of Headmasters of 80 flood-prone schools and flood-affected local people in the study area. In the present paper, MapInfo 7, MS Excel 2007 and field photographs have been used to provide visual information.

Status of Education

Education is an important index of human development of any region. The percentage of literacy rate is 72.14 in the study area. But the percentage of literacy rate is varying from block to block. The highest percentage of literacy rate is 75.1 in the Pursurah Block and the lowest percentage of literacy rate is 69.9 in Khanakul-I (Table 1, Fig. 2). There are 843 ICDS, 662 Primary, 9 Junior, 66 Madhyamik and 42 H.S. schools in the study area. There are also three colleges in the study area (Table 2, Fig. 3) (Census Handbook, 2001; Hugli District Profile, 2009).

Impact of Flood on Education

Among those 80 vulnerable schools, 60%

Block	No. of Educational Institutions by Levels						
	Primary	Junior	Madhyamik	H.S.	College	Non-Formal	
Khanakul-I	174	5	17	8	1	253	
Khanakul-II	149	3	14	6	-	179	
Arambagh.	207	1	23	16	-	237	
Arambagh(M)	24	-	2	5	2	3	
Pursurah	108	-	10	7	-	171	
Total	662	9	66	42	3	843	

Table 2:	Educational	Facilities in	Darakeswar-	Mundeswari	Interfluve
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Source: Hugli District Profile, 2009

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Fig. 3

are flooded every year, 40% are flooded every few years or rarely. But it varies block-wise. The number of flood-affected schools in each year is maximum (85%) in Khanakul-II Block and minimum (40%) in Arambagh Block (Table 3, Fig. 4). Generally, flood occurs for more than 3 months per year, ranging from July to early October. Thus, most of floods affect schooling at the end of the academic year, especially between September and October.

Our survey has revealed that flood is one of the factors disrupting study programme accomplishment and thus affecting the quality of current education in the study area, particularly in blocks, which are prone to floods and where schools were constructed without proper flood resilient measures. When there is flood, students always encounter difficulties to go to schools because of road damages and have to travel across the rivers. Mostly they have to catch a boat, which takes longer time and higher costs to reach schools. Such difficulties could in turn lead to high rate of absenteeism among poor students at the end of each academic year. In some cases, schools were used as an emergency shelters during flood, resulting in damages to school buildings, especially their ground floor.

Difficulty in Accessing the Schools

Public transport in the study area is limited, so students use their own means for travelling to schools, mostly on foot and by bicycle. Since they have to catch a boat during the floods, students in flood-prone areas generally face more difficulties with higher costs to access the schools. Particularly at the end of each new academic year since they have to catch boat instead of going on foot or by vehicle.

According to the headmasters interviewed, about 58 % of their students come to school by boat during flood and only 16% of them by boat during non-flooding season. Thus, students of 35% of interviewed school have experienced more difficulty during flood season. About 62 % used to go to school by

Blocks	No. of Schools	No. of Schoo	l affected	% of School affected		
_	surveyed	In each year	Every few year	In each year	Every few year	
Khanakul-I	20	14	6	70	30	
Khanakul-II	20	17	3	85	15	
Arambagh	25	10	15	40	60	
Pursurah	15	7	8	47	53	
Total	80	48	32	60	40	

Table 3: Number of Schools affected in each year or an interval of few years or rarely

Source: Personal survey conducted by the author, 2012-13





foot and vehicles, 22% need to catch boat during flooding and even during non- flood season as the way to school remains partially under flood water. Nonetheless, 30% said that students still have access to school on foot and 12% by vehicles even in the flood time (Table 4, Fig. 5).

In some places, the way to school is separated by rivers forcing students to catch boat for reaching schools in both dry and wet seasons. These students spend more time and money for traveling to study than the others and even much more during flooding time in the rainy season.

Analyzing the case of one secondary school in Baligori Mouza (island) of Natibpur-I Gram Panchayat in Khanakul-II Block, it may be pointed out that the students of this floodprone island are bound to travel to continue their studies in higher secondary school at Sabalsinghapur or Natibpur mouza. It may be noted that to travel from the Baligori mouza to the Sabalsinghapur or Natibpur mouza, students have to catch a boat which is costly during the occurrence of flood. In this case, some students coming from poor families are unable to afford continue their studies in Sabalsinghapur or Natibpur high school due to higher expense on traveling and thus decide to drop out from school.

Table 4 : Means used in accessing the Schools

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Means used	Before	During
_	flooding	flooding
Foot	62%	30%
Vehicles	22%	12%
Boat	16%	58%

Source: Personal survey conducted by the authors, 2012-13.





An interview with a school teacher who has been teaching at Baligori secondary school for more than twenty years revealed that around half of the total students passing final examination in class-VIII usually decided to drop-out from school because of financial stringency resulting from poverty.

"Through my observation, among 15 students who successfully finish class-VIII, around 7 students do not continue their studies at Sabalsinghapur or Natibpur mouza because of financial problem. Their families, which are mostly poor, cannot further provide financial support to those students for traveling to school. As a result, some of those drop-out students usually assist their family members in the cultivation and some migrate to various places for job or vocational training," said the teacher.

Mithun Das, a 17 years old boy, has dropped out from school for two years due to lack of fund for supporting travel and accommodation expanses. He passed class-IX final exams in the academic year 2009-2010 and continued in class-X at Sabalsinghapur or Natibpur High School for only a few months as his family had financial difficulties to support his studies. Currently, Mithun Das help his parents in cultivation and other household works and does not have any clear plan for his future.

Student Dropout Rate caused by Flood

The student dropout rate caused by flood is rather high compared to the normal drop-out rate. The average dropout rate during 2007-2011 has been around 5 percent per annum, i.e., about 240 students per year. This dropout rate is well below the five-year dropout rate average among the four blocks, which is 6.5 percent annually.

The absenteeism rate in relation to difficulties caused by floods is rather high (Table 5, Fig.6). In some cases, students discontinue their studies for a period of around one month as the way to school is affected by flood and they cannot afford to travel to study as they mostly belong to poor family.

The result of a qualitative interview with one primary school headmaster in Khanakul-II Block indicates that some students do not complete their courses because of the difficulties caused by floods. These students mostly come from poor families, which are away from the school and cannot afford to travel during flood. As a result, these students are generally perceived to be poor in knowledge compared to others in the class. Hence, these students cannot perform well in final examination. That's why, they cannot be promoted to next class and in most cases, these students dropout from school.

Table 5: Student Dropout Rate in different

 Flood-Years

Year	Total	% age of drop-out rate due
	Drop-out	to flood
2007	325	170(52.3%)
2008	195	80(40%)
2009	305	165 (54.1 %)
2010	175	75 (42.9 %)
2011	185	90 (48.6%)

Source:	Personal	survey,	conducted	by	the
authors,	2012-13.				





Uses of Schools as Emergency Shelters

Interviews with several school headmaster in various blocks show that people evacuate their animals in the school buildings, particularly cattle and pigs, making the floor of the schools unusable, for example in the severe floods of 2000, 2006, 2007, 2009.

The situation of Sabalsinghapur Primary School in Khanakul-II Block can be discussed as an example. "During 2000, 2006, 2007 and 2009, some villagers living close to this primary school evacuated their pigs in the classrooms of the school because the other places were under water, while some used the school as a warehouse for rice seed storage. Generally, seed storage does not cause any damage to Impact of Flood on Education in Darakeswar-Mundeswari-Interfluve in Hugli District. 47

Year	No. of ICDS CentreDamage	No. of Primary School	% of ICDS CentreDamage	% of Primary School Damage	
2006	130	104	15.4	15.7	
2007	145	99	17.2	15	
2009	185	160	21.9	24.5	

Table 6: Number of School Buildings and ICDS Centres Damaged

Source: Disaster Management Department, Arambagh, Hugli, 2010

Percentage of School Buildings and ICDS Centres damaged in three Major Floods

Fig. 7

the school unlike animal evacuation, which mostly affects the school floor but does not interrupt teaching'', said the school headmaster.

However, the uses of schools as emergency shelters are not as frequent among the interviewed schools.

School Buildings and ICDS Centres Damaged

According to Sub-Divisional District Primary School Council, the number of Primary Schools and ICDS centres damaged, varies in different flood years. 15.4 % ICDS centres and 15.7 % primary schools were damaged due to flood in 2006. Similarly, in the flood of 2009, 17.2% ICDS centres and 15% primary schools were damaged respectively. The highest percentage (21.9%) of ICDS centres and primary schools (24.5 %) were damaged in 2009 flood (Table-6, Fig-6).

Findings and Suggestions

The Primary Schools and ICDS Centres

usually experience severe damage during the occurrences of flood, which result in discontinuation of study. Keeping in view such long standing experiences, adequate temporary ICDS Centres should be running in the postflood period for the regularity of elementary education (Plate 2).

The headmasters of local schools as well as the guardians expressed their concern over the situation of education during the time of severe flood. According to them, all the schools of the affected mouzas are used as the flood shelters, which wastes a lot of working days. In this regard, attention of the Education Department can be drawn on the yearly academic calendar that the vacation should be extended during rainy season by reducing other vacations to save the education from a great loss and larger interest of the society. In addition, special attention is to be given to build up sufficient permanent flood shelters.

Education can play an important role for flood management. So, a Disaster Risk Management (DRM) based curriculum for educational institutions has been introduced in both general and technical syllabus. Central Board for Secondary Education (CBSE) has introduced Disaster Management as a part of their course curriculum in standard VIII in all the Schools of the State. The Government of West Bengal also has introduced this curriculum



Plate 1: Structural modification of a school building (construction of classrooms above 12 feet from the ground) for protecting the same from the ravages of flood in Khanakul-II Block

at the school level from standard VIII and above. In addition, another important and relevant measure, which can be adopted in the study area, is structural modification of school buildings of large scale (Plate 1).

Conclusion

It may be noted that the school buildings get inundinated during the period of flood. Sometimes the school buildings become shelter of the poor people in the study area during and after the flood for certain period. After flood is



.Plate 2: The primary schools and ICDS Centres usually experience severe damage during the occurrences of flood, which result in discontinuation of study. Keeping in view such long standing experiences a temporary ICDS Centre is running in the post-flood period for the regularity of elementary education.

over, the students of the study area get engaged in re-construction of settlements and work for raising fund for solving the economic problems of the rural flood affected population. Ultimately, it also increases the number of dropouts from the schools. The education centres of the study area remain closed on an average 7 to 14 days in a moderate flood. Sometimes it is extended to 20 to 30 days in the devastating flood years.

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National Geographical Journal of India, An International Peer-reviewed and refereed Journal of India (NGSI-BHU, ISSN: 0027-9374/2016/1576), vol. 62 (1), March : 49-60

Poor Sanitation and Vulnerability of Women: A Geographical study of slums in Varanasi City

Pratibha Yadav and Ram Bilas

Poor sanitation is an issue that can affect everyone but women are often the most at the risk. A lack of access to a clean, safe toilet can impact girl's attendance at school, increase women's burden of work and leave females at risk of sanitation-borne diseases. The aim of this paper is highlighting the socio-economic condition and linkages between poor sanitation and vulnerability of women in slums of Varanasi city. Based on primary and secondary data 150 households was randomly selected and 30 Households have been served from each sample slum through questionnaire for the analysis. Survey on women resulted that due to unimproved facilities and poor sanitation they suffered with diseases such as diarrhoea, urinary tract infections, skin disorders, respiratory diseases etc while those who have availability of improve toilets and adequate water supply within premise they suffered less. There is an urgency to tackle this situation for long term development as well as for city and National prosperity.

Key Words: Sanitation, Women, Diseases, Vulnerability, Slum.

Introduction

Sanitation is one of the basic needs of human beings has a direct relationship with health, nutrition and social well-being. Without sanitation or with poor sanitation our life will be clutched with fatal diseases and will create a havoc situation. So access to sanitation is crucial for human survival. The word sanitation is derived from the Latin word *sanitas* which means health, hygiene or relating to health (Nagendra and Suresh2010). 40 percent of the world's population (2.4 billion) has no access to hygienic means of personal sanitation. Globally, WHO estimates that 1.8 million people die each year from diarrhoeal disease. Combined impact of inadequate sanitation as a driver of diseases sanitation the biggest killer of children under five, typically diarrhoea, endemic cholera and respiratory infections may make inadequate sanitation the biggest killer of children under five. Nearly 5,500 children die every day and 2.4 million each year from diseases caused by contaminated food and water (UN, 2012). United Nation General Assembly explicity recognised the right to safe clean water and sanitation and acknowledged of all humen right.Sanitation generally (Placeholder1)refers to the provision of facilities and services for the safe disposal of human urine and faeces. In the absence of

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proper sanitation, people suffered from high levels of infectious diseases leading to high incidences of morbidity and mortality. This directly affected the ability of a country to maintain an efficient economy and implied great personal suffering among infected individuals and their families. "Sanitation is more important than Independence" Mahatma Gandhi once said. It is been 68 years since independence and sanitation is still a neglected sector in India.

Due to rampant growth of population, millions people continue to migrate to urban India every year with most of them finding their way to slums within and on the fringes of cities (Kaushik and Sharma, 2010.)Urban congestion, tremendous migration of labour forces both skilled and unskilled, non-availability of housing infrastructure is leading to occurrence of slums reflect the deteriorating quality of life in urban areas (Kundu, 2007). Areas, which are seen to be over crowded, dilapidated and faulty laid out and lacking in essential services are generally termed as 'Slum'. A slum is a compact settlement with a collection of poorly built tenements, mostly of temporary nature, crowed together usually with inadequate sanitary and drinking water facilities in unhygienic conditions in that compact area. It is clear that urban areas have more people than they can support given the present urban infrastructure and slums are now becoming the permanent features in towns/cities. Geographically, a slum is an urban site possessing a quite contrasting spatial, structural and socio-economic situation of urban environment (Eswaramma et al, 2006) for a country like India with huge population and limited access to basic amenities; it is a challenge to manage the human excreta itself. It is therefore, country is focused on construction of toilets. The sanitation problem is most evident in urban poor (especially for women).

Sanitation is key to healthy city. Slums are typically overcrowded, lack basic services and facilities, and hence are unhygienic and unsafe.Growing slum population and lack of adequate sanitation force over 50 million men, women and children to defecate in the open every day. Low access of sanitation and improper hygiene behaviours are incrising the enormous diseases burden. They could have also a major effect on the girls health. The slums of Varanasi portray a pathetic picture of life in slums. The need for improved urban sanitation in India is pressing and warrants public and philanthropic investment. Increasing levels of urbanization, rising densities of slums and historical lack of attention to urban sanitation only make this need more urgent.

Sanitation and Women

Women and children are vulnerable to health hazard in slums as they spend most of their time at home and get affected by the unhealthy environment. Open drains, lack of fresh drinking water, exposure to flies and mosquitoes, unhygienic sanitary practices (open defecation), social taboos etc, affect their health. Apart from above factors worse economic condition pushes them into the vicious circle of various health threats. Following are the main areas which are needed to be addressed to enhance their health condition:

 μ Reducing maternal mortality rate and infant mortality rate by improved medical facilities, proper hygiene and adequate sanitation.

 μ Discouraging open defecation by building toilets in every house.

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 ${}_{\mu}$! Ensuring toilet facilities in schools and colleges.

 μ ! Making girls aware about health education when they enter reach puberty.

 μ ! Ensuring proper functioning of government facilities such as Anganwadis, ASHA, and ANMs etc.

 μ ! Encouraging women for education which will ensure their economic independence and change their attitude towards social taboos and they become less vulnerable to domestic violence.

Objectives

 μ ! To know the socio-economic condition of slum women of Varanasi city.

 μ ! To study the water supply, sanitation facility and related health issues of slums of Varanasi City.

Database and Methodology

The study is based on secondary as well as primary data. Secondary data are collected from Census, NSSO, CDP-JNNURM, District Urban Development Authority (DUDA) and Slum Development Urban Authority (SUDA) of Varanasi city. Primary data are collected by sample survey of randomly selected 150 households of conveniently selected slums (Nagwa, Durgakund, Maldahiya, Rajghat and Indrapur) of Varanasi city through an interview schedule. The paper begins with an overview of socio-economic condition of dwellers. The paper highlight the problems related to inadequate water supply and sanitation facilities of slum dwellers especially for women in Varanasi city with the help of various indicators adopting purposive sampling for data Collecting and has been analysed by using Ms Excel and SPSS for interpretation along with Arch GIS for mapping.

Study area

Varanasi (82°56'E - 83°03'E and $25^{\circ}14'N - 25^{\circ}23'N$) is one of the oldest city situated in middle Ganga plane is a place of pilgrimage and a holy site for sacred baths in the Ganga (Fig.1). Due to increasing population growth and rapid development of Varanasi by 1991 it became million cities. Varanasi shows a constant increase in the population with varying rate of increase from decade to decade. In last seven decades the population has grown almost six folds, with increase in population from 207,650 in 1931 to 1,202,443 in year 2001 and 1535 279, in 2011 (Table 1). Rapid urbanization has increased urban problems in Varanasi city. The mass of population generated more pressure on the urban services. Slums in Varanasi city has been continuously increasing from 1941 to 2011. Varanasi has 227 slums spread all over the city, either on government or private lands. Total population in slums is about 453,222, which is about 37.69 percent of the total city population (Fig. 2).

These 227 slums have formulated 21 Community Development Centers (CDC), which are responsible for the overall development of the slums along with Slum Urban Development Authority (SUDA). Majority of slums have very poor water supply and sanitation facilities; most are either unsevered or partially severed, with disposal of household wastewater and solid wastes taking place directly into open drains. This phenomenon has adversely affected drainage system in these areas and led to water logging in different areas. The poor environmental conditions within the slum areas have adversely affects the health of the residents. Financial constraints on the part of civic authorities and

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un-authorized nature of the slums have also contributed to non-delivery or partial delivery of basic amenities.

Profile of Sample Slums

The slum population in the city accounts for about 37.69% of the city population. For sample survey 5 slums were selected from the different parts of Varanasi City. From each slum 30 household were surveyed. The **Nagwa**

Table1: Growth Rate of total popul	ati	on
and slum population in Varanasi City	y	

Year	Total population	Slum population	BPL Population
2001	12,02,443	4,53,222	96,344
2006	13,70,785	5,16,668	1,09,787
2011	15,35,279	5,76,646	12,96,62
2021	19,65,157	7,40,667	15,73,91
2031	25,74,356	9,70,274	20,61,83

Source: DUDA, Varanasi, 2006.

Table 2: Slums in Varanasi city

slum which is located in ward no.8 and on the southern part of the Varanasi is adjacent to the west side of Ganga River. **Maldahiya slum** is situated in the middle part of the city. It is mainly situated behind the Mahatma Gandhi KashiVidyapeeth University. Due to location on main road the position of dwellings is better than other slums. The **slum of Durgakund** is situated on the western side of Lanka-Ravindrapuri road near Durgakund temple. Here the dwellers belong to sweeper community. The living standard and economic status is comparatively better than the dwellers of Nagwa slum. **Rajghat slum** is situated on the eastern part of Varanasi city on the east of Varanasi-Mughalsarai main road and on the west of Ganga River. **Indrapur slum** is located in northern part of the city. This is in outskirt of the city.

Socio-econonic condition of slum dwellers

The personal profile of sample slum dwellers have showns that most of them are



Fig.2

City	No. of HH	Population	Area(Ha)	Density (person/Ha)	HH size	Average Income (Rs/Day)
Varanasi	151654	1202433	7979	150	7.3	-
Slums	57055	453222	1372.6	330	8	100-150
Percentage	37.6	37	17	-	-	

Source: DUDA (District Urban Development Agency), 2006.

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Table 3: Type of works done by women in slums

Slums	Type of work (in percent)					
	Housemaid	Vender	Handcraft	Nothing		
Nagwa	10	10	20	60		
Durgakund	35	20	15	30		
Maldahiya	40	15	20	25		
Rajghat	15	10	30	35		
Indrapur	20	20	25	55		

Source: Personal Field Survey, 2014



Fig.	3
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Iable 4:	Housing	condition	ın	sample	siums.

Slums	Kuchcha(%)	Semi-Pucca (%)	Pucca (%)	Total no.of HH
Ngawa	26	50	24	30
Durgakund	10	20	70	30
Maldhiya	15	25	60	30
Rajghat	20	30	50	30
Indrapur	34	26	40	30

Source: Field Suvey, 2014

Hindu while some are Muslims, falling in schedule caste category.Most of them are illitrate,some are educated upto primary level while a few were able to write their name.Most of the household had nuclear family type with varying family size. About 50 percent were migrants from adjoining state of Bihar while some are from states such as Jharkhand, West Bengal. The important push factors were povery, unemployment and low wages, while the important pull factors included better employment opportunities, attractive wages and higher standerd of living. 59 percent of women from the sample slum are working in informal











sector in different occupation e.g. domestic workers, Vendors, ragpicker, Bidi maker, artisans etc. They are working on very low daily wages which is sometimes very low to fulfill their basic needs. Some of them are employed in government jobs as *safai karmcharis* are getting very attractive salaries which enhance their way of living thereby better health conditions. Appproximatly 41 percent female are not involved in any earning activities. Table 3 shows type of work in different slum areas and economic condition of Durgakund and Maldahiya area reflected much better picture in comparison to slums in other part of the city (Fig.3).

Housing conditon of sample slums

Living conditions have a direct impact on

public health. Structural conditions of house are a good indicator of the condition of the living environment (Ali, 1995). Housing condition of sample slum dwellers are poor, some are living in bomboo and plastic made jhuggi.while some are living in *semi pacca* house and only few have pucca houses. Lowest percentage of kachcha houses in Durgakund slum because they have Rajeev Gandhi Awas and they are also working in informal sector as Safai karmchari where as highest pecentage are found in Indrapur slum. In this study most of the slum dwellers have pacca houses but their condition is very meserable (Table 4). Size of room is very small (10X10 Feet) and ventilation facility is poor. Over all single rooms are dominant among the sample house holds. In these tiny rooms, some of the large size house hold with six to eight members have to be accomodeted besides providing space for cooking and other activity. There are over crowding in slums. Which makes very unhyginic and unhealthy housing environment (Fig. 4).

Source of drinking water

Availability of water could reflact the health condition of women and chidren. It is reported that 65 percent sample slum dwellers use water of community taps, 30 percent use

Table 5 : Distribution of toilts and Community

 Dustbin in Sample slums

Sample slum	No.of	No.of Comm-		
	Toilets	unity Dustbin		
Nagawa	12	0		
Durgakund	22	1		
Maldahiya	25	1		
Rajghat	16	1		
Indrapur	15	0		

Source : Personal Field survey, 2014

private taps and percent houses have hand pump (Fig. 5). The whole responsibility of bringing water relies on women and girls of the house and maximum time spend into accumalation of water.

Toilets and Sewage disposal facility

Sanitation is not only important for healthy living but also ensuring a non-polluted environment. The majority of sample households had poor toilets and sewage disposal facility. The condition of Indrapur, Rajghat and Nagawa (Table 5) is worst where more than half of sample household had poor toilet and sewage facility. Most of Children are going to open defecation on road sides, and open drains. Women Situation are worst, they are also going to open defecation in dark, because they have no toilet facilities at home. Some time dangerous insects and sneaks bite them. The risk to human health is compounded in these slums, where garbage collection is nonexistent in most cases and drainage tends to be poor, promoting the growth of insects and other diseases vectors. There is no adequate arrangement for the dumping of domestic wastes. Only three sample slums Durgakund, Maldahiya and Rajghat have single community bins and Indrapur and Rajghat don't have any type of dustbins. (Table.5). Only one third households used the place fixed by municipality for the dumping of domestic wastes, which creates an unhealthy environment.

Hygien of women

Personal hyiegne including genital hyiegne is considered a very important factor having bearing on health. Taking bath is the best way of keeping high pesonal hyiegne. 25.6 percent of the women having daily bath, 29.4 percnt of respondent take bath once in two days, 14 percent take three time in a week, 3 percent take bath once in a week, respetively. Lack of availability of water and unadiquate bothrooms are appear to be major constraint. Hand washing is good habit. It is reported that it decreses 50 percent of deseases. In sample slums, habit of handwashing was found below 50 percent.

Women education and sanitation

Due to wide spread poverty in the slum areas, illiteracy prevails and even it can be said that poverty exists because illiteracy exists (Tripathi, 2010). The study reveal that about 70% of slum women are illiterate (Fig. 6). Only 30% of women are literate, and many of them write their name only. The main reason for the low rate of education is getting engaged with labour work at an early age. Children above 15 years get occupied in labour work to help their family economic condition and they force to leave schools, the second reason of low rate of enrolment and attendance in schools is inadequate water facilities and miserable condition of toilets facilities. There is no facility of separate toilet for girls in most of the schools. When the girls reach at the stage of puberty, they missed their classes, it is directly affects Level of education in sample slum(in percent)



■Respiratory disease ■Gastric Problem ■Urinary trac infection ⊠Skin problem □others

Fig.7

Utilisation of Medical Facilities





their education.

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Women health issue

Women and men share many similar health problems, but women also have their own health issues, which deserve special consideration. Women, living in slums face high risk of diseases due to vulnerable economic and social condition. It is important that every woman has access to knowledge related to the spectrum of women's health issues, not only about her reproductive system, but about all aspects of her body. But women living in slums have no adequate knowledge about it. Diseases

like Depression, Urinary tract infections, bladder infection, white discharge, menstrual problems, high Blood pressure and Diabetes, Cardiac skin, and eye problems predominantly found in study area. Smoking and consuming tobacco may pose a harmful effect of health on women and other around them. Most of residents are smoking in spite of the wellpublicized risks of lung disease including cancer. Urinary infection is the one of the most common disease found in women in slums. It's occurring due to bad sanitation facilities. 60 percent Women suffered from this disease, 15 percent female were suffering from respiratory, and 10 percent had Gastric, skin and other problem (Fig.7). During the survey, it has been found that poor people living in areas without any Sanitation or Hygiene education, spent Six Times more on medical care than people who lived in areas with access to sanitation and who had a basic knowledge of household hygiene.

Medical facilities

Women live in sample slums have many heath issues. Therefore medical facility is a significant parameter of measurement of health of women. In sample slums, 38 percent slum dwellers uses private clinic and 45 percent government hospital, while 17 percent uses traditional medical practitioner. The condition of Durgakund and Indrapur are better than other slums, because Dugakund has one PHC and Indrapur ward has one PHC and one CHC. (Fig.8)

The study reveals that conditions of women in slums are not satisfactory. But Women of Durgakund and Maldahiya slum have good living condition, because basic services such as good housing condition, adequate drinking water and sanitation facilities are available here comparatively other localities. Here women economic condition are also good because of they are working in formal and informal sector. They are getting very attractive salaries which upgrade their way of living thereby better health conditions. The toilets facilities found in Nagwa slum, are not good. The basic facilities are very poor in these slums. It has been noticed that the average living condition of female found in Indrapur and Rajghat slums and situation is worst in Ngwa slum.

Conclusion

Government should monitor previously implemented programmes and policies for women and children and ensure their proper functioning. There is need to promote sanitation awareness program in slums. There should be programs for stopping open defecation, providing safe water to all and waste disposal facilities.

Sanitation should be integrated into education policy supported by sufficient resources and concrete plans to ensure that, all schools have adequate sanitation facilities including hand washing facilities and separate toilets for boys and girls with access for students with disabilities. Specific provision should be made at school for establishing proper menstrual hygiene management facilities. Hygiene promotion should be included as an important part of the school curriculum from primary level. The role for public private partnerships in addressing the sanitation crisis should be addressed.

It is evident from the study that slums women are deprived on account of each and environmental and social every parameter.Slums are typically overcrowded, lack basic services and facilities, and hence are unhygienic and unsafe espacially for women. The study highlights low level of sanitation and basic amenities in slums of Varanasi city. The housing, literacy, sanitation and medical facilities are poor, the lack of water supply in the slum areas leading to high dependence on ground water, the lack of proper waste disposal facility and poor sewage system leading to pollution and health related problems. The consequences are devastating especially on women. Where there are no toilets, girls commonly avoid school, without access to toilets, women and girls must wait until it is dark to defecate, exposing themselves to harassment and sexual assault. Diarrhoea resulting from poor sanitation and hygiene is responsible for the death of more than two million impoverished children each year. Neither slums can be removed or shifted completely from the cities. However, full utilization of the meagre efforts and state welfare policies can give them some relief or make their living condition slightly better if honestly implanted. There is an urgent need to tackle this situation for long term sustainable development as well as for city and National prosperity.

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Environmental Impact of Iron ore Mining in Bellary District, Karnataka: Using Geo-Spatial Techniques

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Accurate and reliable information on the distribution of various earth resources, urbanization, industrialization etc., form the backbone of Environmental Impact Assessment study. Environmental Impact assessment (EIA) is a process, used to identify the environmental, social and economic impacts of proposed and completed project. Environmental Impact Assessment in the wake of iron ore mining of Bellary district has been studied using 1991 and 2001 LANDSAT TM images downloaded from earth explorer and IRS LISS III image of 2011 downloaded from Bhuvan. The EIA index reveals that mining operation and associate activities have negative effects on physical environment of Bellary district. During 1991, 336.43 in 2001, 220.79 and in 2011, 459.29 hectares of forest area have been utilized to dump mining residual. During the process of transporting ore from mining site to industry the extracted ore had spread over 9537.78 hectares of area within a span of 30 years i.e., 1991 -2011. In 1991 there were 69.69 hectares of area covered by over burden materials spread by running water and other forces and in 2001 it increased to 281.06 hectares and in 2011 it has slightly reduced to 228.24 hectares. The forest area is not only used for dumping the mining residual but also most of the mine ore is extracted from the forest area which led into reduction of forest area to a greater extend.

Key words: EIA, Satellite images, Excavation, Spatial techniques, FCC, Mining leases, exploration

Introduction

Remote sensing technology is an important tool for mapping the physical and national resources of a region using the landsat Thematic Mapper (TM) and Indian Remote Sensing (IRS) Satellite's data products. Due to ever increasing demand of iron ore resource and rapid growth in the industries and population the mineral resource is explained unabatedly. The over exploitation of mineral resources led to ecological imbalance in the natural ecosystem and generated more negative impacts. The best way to avoid negative environmental impacts an reinforce positive impacts is to prepare environmental impact assessment (EIA) Index maps at the lowest administrative unit like village or *mandal* and initiate necessary resource for proper planning, conservation and optimum

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utilization of natural resources (Obi Reddy and Sambasiva Rao, 1992). EIA is a decision making tool, which guides the decision makers at appropriate decisions for both the proposed and completed Projects. It aims Predicting environmental impacts at an early stage of project planning and design, find ways and means to reduce adverse impact, shape projects to suit the local environment and present the predictions and options to decision makers (EIA guidance Manual, Govt.of India, 2010). The iron ore mining activities in Bellary district threat sever impact caused on the local community and the environment in one of the extensively mined iron ore belts of Karnataka i.e., Sandur-Hospet-Bellary Belt where the mining activity has posed a big threat to the entire ecosystem(Prabhakar, Rudramuniyappa and others, 2008). The mines have significant impact on economic, social and industrial development in each country. Today, nearly all the industrial establishments consume at least one of the minerals in their process of production and this reveals the importance of mines and minerals in the new world (Ranganath, 2001).

Mining of any kind of mineral and its associated activities, generally being considered to be an environmentally unfriendly activity, attracted the attention from the stand point of environmental impacts and hence, their mitigation. It is an obvious fact that the mining is a primary activity, which usually takes place at a site where the minerals exist and after the extraction of minerals the land is of no use to mining companies. Mining and its associated activities impact all the components of environment. The impacts are permanent / temporary, beneficial/ harmful, repairable/ irreparable, and reversible/ irreversible. The impact of various mining and associated activities on the environmental components is discussed briefly hereunder.

In the study area the exploitation is done by open cast mining. The mining methods are mechanized and they comprise of three main operations, blasting, recovering and loading and transportation. Mining activities have developed gaping pits. Water gets logged in these pits due to lack of post-mining reclamation efforts. It reduces the land stability, makes the soil weak and favors erosion of the top soil. Excavation is done by drilling and blasting and transportation of ore is done by dumpers. Ore processing such as crushing for size reduction are also being done by dumpers in the plant site. These activities have affected the configuration of the land. It has also led to disruption of the ecology-affecting the quality of air, water, plant, animal life and micro organisms, soil, and vegetation, drainage, agriculture and human habitation.

There is conflict between mining activities and external environment which has been intensified in recent decades as mining has destroyed the natural resources such as land, water, vegetation and others. Physical changes have been aggravated and they have led to grave chemical and bio-chemical changes, many of which are yet to be understood by man. The extent of the environment impact can range from scarcely perceptible to highly obstructive and the nature of impact can similarly vary widely due to open pit mineral methods of mining. The specific problem of non-ferrous metals is the disposal of tailings. Dumps of overburden not only bleach the soil but also wash out debris and harm flora and fauna of the region.

Environmental impact assessment is intended to identify the impact (both beneficial

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and adverse) of proposed public and private development activities. Often, the focus is dominantly environmental (bio-physical) but good practice also addresses social and economic aspects. EIA is mainly used at the level of specific developments and projects such as dams, industrial plants, transport, infrastructure, farm enterprises, natural resource exploitation and others. Strategic environmental assessment (SEA) is a sister tool applied upstream at the level of policies, plans, and programmes like SEA. EIA is most valuable when applied early in the planning process for a project as a support to decision-making. In the present chapter an attempt has been made in two different ways one which encompasses the assessment of the adverse impact of mining and its associate activities on biophysical aspects like agriculture, water bodies, forests and others with the help of Geo- informatics techniques and another includes the aspects of sustainability practices of mining by empirical observation.

Study Area

Bellary district is located in the Eastern part of Karnataka state. It spans over an area of 8,447 sq.kms. The study area lies between 14° 33' North and 15° 50' North latitudes and 75° 42' East and 77° 10' East Longitudes. The mineral bearing area lies in part of Bellary, Hospet and Sandur taluks (14° 15' North latitude to 15° 20' North latitude and 76° 20' East longitude to 76° 55' East longitudes) popularly known as BHS mining region. The iron ore deposit of BHS region is confined to two main bands forming the spindle shaped Sandur schist belt (1) the Eastern Copper mountain belt and (2) the Western Sandur belt. Topographically the region has a rugged terrain covering with scanty vegetation (Fig.1). The district is bounded on the North -West by Gadag district, on the North by Koppal district, on the North - East by Raichur district and on West by Haveri district, on the South is Davanageri, on the South-East is Chitradurga district of Karnataka state, on the East by Anantpur and Karnool districts of Andhra Pradesh. Bellary known for its high grade iron and manganese ore deposits, is chiefly composed of ironformation and epidiorites , structurally it is canoe-shaped doubly plunging synclinorium (Shivakumar and Naganna,1975)

Objectives

Following are the specific objectives of the present study to make it more meaningful.

1. To measure the extent of mining area from 1991 to 2011 with the help of Geo-Spatial techniques and trends of mining leases

2. To demarcate the regions of 5 and 10 kms radius and evaluate the environmental impact of mining in these regions: using Geo-Spatial techniques.

3. To examine the spread of mining residuals due to external forces and its impacts on physical environment of the study region

Hypotheses

Following hypotheses are formulated and examined with suitable technique to strengthen the study and make it more meaningful.

1. There is a positive correlation between the distance of the mining site and intensity of impact on the environment i.e., greater the distance from the mining site boundary lesser the impact of intensity and vice-a versa.

2. Disposal of mining residuals at an appropriate location leads to minimize the spread and deterioration of the environmental quality.

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3. Sustainable development of mines and minimise the negative impact can be done through the strictly adaptation mitigation measures (Rehabilitation and Resettlements) rules.

Data base and Methodology

The present study is based on both primary and secondary data. Secondary data has been generated by employing Geo-Spatial techniques. The two year images *i.e.* 1991 and 2001 LANDSAT TM images are downloaded from earth explorer and IRS LISS III image of 2011 was downloaded from Bhuvan. The downloaded satellite images were used to plan the survey in the study area using FCC (False Color Composite) format. The tracing data were collected from field using GPS survey technique. Digital analysis of land use and land cover changes has been carried out through FCCs of the study region. The rectified satellite images of the study area were then classified



in ERADAS 9.1 software, and with the help of training data collected from various training sites were applied to entire image, and multispectral pixels of the study area images were classified into nine broad land use classes. Further, 5 and 10 kms buffer zones have been made from each mining operation site and the affected area has been measured separately. Similarly, disposal of mining residuals and the area covered by them area also measured and tabulated.

Ground truth

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Supervised classification was done by taking 30 training samples for all the three satellite images viz 1991, 2001 & 2011. Several visits were given to the study region for ground truth and collected 30 GPS points and again classified the same images for land use and land cover pattern in Bellary district.

Primary data has been gathered through questionnaire schedule. Questionnaire consisting of 23 questions exclusively for mine owners was prepared and the researcher personally visited the mining sites and contacted the owners of the mines and collected the information. The collected data has been tabulated and the obtained results have been shown by chart and diagrams and also prepared the buffer zones maps.

Impact Assessment with the help of Satellite Images and Spatial Techniques

Extension of mine area and its impact (1991-2011)

Bellary district is known for mineral resources in India particularly iron ore which contributes to 20 per cent of India's production and 90 per cent production of Karnataka. Good quality of iron ore is available in Bellary district, therefore, the number of leases and ore extraction areas have increased year after year. During 1991 there were 42 leases involved in extracting the iron ore over 6,838.25 hectares area. In 2001 the total leases and area has increased to 84 and 8568.02 hectares respectively. During 2011 the total leases were 122 and total area was 10069.13 hectares (Table. 1 & Fig. 2 & 3). It has been noticed that within a span of 10 years *i.e.* from 1991 to 2001 42 leases increased and mining area increased to 1728.77 hectares and between 2001 and 2011 the increase in leases were 38 and mining area was 1501.11 hectares.

Dumps of Mining Wastes and it Impact (1991-2011)

Mining is such a primary activity which

					0	5	· · ·	,
Name of	1991		2001		2011	,	No. of	Mining area in
the taluk	No. of	Area in	No. of	Area in	No. of	Area in	lease from	hectares from
	leases	hectares	leases	hectares	leases	hectares	1991-2011	1991-2011
Bellary	02	94.70	06	384.53	03	239.87	11	719.10
Hospet	10	1284.52	05	235.46	05	217.85	20	1737.83
Sandur	30	5459.03	31	1109.78	30	1043.39	91	7612.20
Region	42	6802.25	42	1726.77	38	1501.11	122	10069.13
total								

Table 1: Trends of leases and extent of mining area in Bellary district (1991-2011)

Sources: The Director, Dept. of Geology and Mines, Bellary

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BELLARY DISTRICT MINING ACTIVITIES AND AFFECTED COMPONENTS, 1991 - 2001

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cannot be undertaken everywhere; generally it takes place where it is endowed with natural resources. This activity needs some vegetation to be cleared and top soil removed before the excavation of ore. Once this process starts remarkable changes take place over the natural landscape and in future such land cannot be used for any other purpose for a long duration as it become unproductive and weak in respect of its fertility. The unproductive materials like loose, unconsolidated, overburden materials, tailing ponds etc. are removed from the surface of the land for the process of mining activity, and thereafter these mining residual are dumped at an appropriate site to avoid social and environmental issues.

Removal of ore from earth generates large quantities of waste such as soil, debris, overburden and others. The bigger the scale of mining, greater is the quantum of waste generation. Open cast mines generate much higher quantities of waste as compared to the underground mines producing 8 to10 times as much waste as underground mines.

Economic and industrial development of the country depends on the mineral production, but unscientific and illegal mining adversely affects all the components of the earth. Dumping of mining residuals takes place as extracted good quality ore is important. If such materials placed at a suitable place and major precautionary measures taken for not spreading out such materials beyond the demarcated zone, certain environmental and social issue can be solved without putting much effort. In the present context an attempt has been made to measure the mining waste dumps with the help of GIS techniques. During 1991 there were 42 companies actively involved in extracting the iron ore and these companies have utilized 336.43 hectares of forest to dump the mining waste and in 2001 the mining waste dumped area has marginally decreased to 220.79 and in 2011 the 38 companies extracted iron ore and dumped mining residual over 459.29 hectares area (Table 2 & 3). It has been observed from the field that most of mining companies have dumped the mining waste beyond the selected land meant to dump the waste.

The area, having thin vegetation prior to mining, due to mining the vegetation is most negligible due to the deposition of the dust particles on the photosynthitically active parts of the plants. The growth of vegetation has been considerably reduced due to overlapping of the dumps the plants species that can only be seen at the sides of the old dump.

The mining area is highly affected by the machineries that are used for excavation, loading and transportation. The intensive movement of these machineries in unmetalled roads caused many issues. Most of the ore loaded tippers are not covered by the carpet and they led to leak of ore on either side of the road from the place of loading until the place of unloading and by this activity the following impacts on landscape have been identified. The near surface bulk density is increased and moisture content decreased by vehicles, dust and fume accumulated on the plants and caused the plants to loose strength and collapse by loss of supporting medium. Compaction from the traffic also injured root systems and prevented germination of few plants; top soil is removed thereby inhibiting the plant growth. During the process of transporting ore from mining site to industry the extracted ore had spread over 9537.78 hectares of area within a span of 30 years. In 1991, extracted ore was spread on

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Sl. Categories 1991 2011 2001 Changes Changes Overall No. from from Changes (1991 -1991 to 2001 to 2001 2011 2011) 1 Mine Area 779.60 1133.27 353.67 2771.55 1638.28 1991.95 (45.37%) (12.76%) (13.63%) (15.47%) (255.51%) (144.56%) 2 Mine Waste Dump 336.43 220.79 -115.64 459.29 238.50 122.86 (5.51%) (2.66%) (34.37%) (2.56%) (108.02%) (36.52%) 3 Spread of Extracted 4922.64 6677.12 1754.48 14460.42 7783.30 9537.78 Ore area due to (80.59%) (80.33%) (35.64%) (80.70%) (116.57%)(193.75%)Transportation & other Actions 4 Spread of Ore and 69.69 281.06 211.37 228.24 -52.82 158.55 Waste Dump due to (1.14%)(3.38%)(303.30%)(1.27%)(18.79%)(227.51%)water action Total 6108.36 8312.24 17919.50 (100%)(100%)(100%)

 Table 2 : Mining waste dumped area in hectares and its spread due to external forces (1991-2011)

Sources: Author computed from the Land sat TM, ETM+ and L8 OLI/TIRS (30 meter) resolution Note: Figures in the brocket show percentile of area

Sl. No.	Years	Mine Area	Mine Waste Dump	Spread of Extracted Ore due to Transportation & other Actions	Spread of Ore and Waste Dump due to water action
1 2 3	Changes from 1991 to 2001 Changes from 2001 to 2011 Overall Changes (1991 – 2011)	353.67 (+ ve) 1638.28 (+ ve) 1991.95 (+ ve)	115.64 (- ve) 238.50 (+ ve) 122.86 (+ ve)	1754.48 (+ ve) 7783.30 (+ ve) 9537.78 (+ ve)	211.37 (+ ve) 52.82 (- ve) 158.55 (+ ve)

Table 3: Mining Activities and Changes in Affected Components in Bellary District (1991-2011)

Sources: Author computed from the Land sat TM, ETM+ and L8 OLI/TIRS (30 meter) resolution

4922.64 hectares of roads and fields by transportation and other action and it has been increased to 6677.12 hectares in 2001 and in

2011, 7783.3 hectares (Table.2). It is pertinent to mention that decade by decade the extracted ore spread over the area of roads, agricultural

and other fields has increased due to unscientific transport and competition among the tipper drivers who wanted to make maximum number of trips in a day and earn more money (Fig. 2 & 3).

The over burden dumps of the working quarries generally comprises of loose, unconsolidated rock materials and are usually unstable in character. The height of the dumps average between 15 m and 20 m and slopes are very steep. After a heavy shower the soil dump causes sliding of surface particles resulting in opening up of gullies on top of the over burden dump. The over burden materials often are washed off into the nalas, thereby chocking their courses. During 1991 there were 69.69 hectares of area covered by over burden materials spread by running water and other forces and in 2001 it increased to 281.06 hectares and in 2011 it has slightly reduced to 228.24 hectares (Table.2). It has been observed from the fact that no proper measures have been taken by the mining lease holders to prevent wash off over burden materials. The

spread of materials by the running water and other actions would have been stopped or minimized by adopting simple techniques like grass matting (is a system) that can be grown around the dumping area and a simple stone wall built around the dumping area (Fig.2,3&4).

Impact on major components within 5 & 10 km radius (1991-2011)

Mining and associated activities have quantitative as well as qualitative impacts on the water regime in and around the mining areas. Streams are digitized from satellite images for demonstrating the image based information generation. Further, buffer zones with 10 & 15 km radius from mining area have been made to measure the intensity of impact with the help of Arc view soft wares. Mining and its associate activities not only use a lot of water but also likely to affect the hydrological regime of the area. The major impact of deep and large mines is of natural ground water table. Lowering of water table may result in reduced ground water availability. Extraction of

Table 4 : Different Components Affected by Mining Activities within a Radius of 5 km & 10 km over the Decades. (Area in hectares))

Sl. Land use and land		5 km			10 km		
No.	cover categories	1991	2001	2011	1991	2001	2011
1	Silted water bodies	436.75	325.24	411.7	569.3	284.7	222.42
2	Forests	50134.26	53780.01	45222.08	8246.45	6981.06	5034.77
3	Agriculture with irrigation	21882.26	17768.06	13850.39	16320.62	16785.73	16710.02
4	Agriculture without irrigation	9368.65	14530.66	12169.52	6879.27	8955.8	2979.02
5	Fallow land	12860.6	19261.37	17599.7	12170.02	18184.85	18851.72
6	Water bodies Total	2479.72 97162.24	2548.52 108213.86	1998.05 91251.44	1803.6 45989.26	2014.03 53206.17	1404.55 45202.5

Sources: Author computed from the Land sat TM, ETM+ and L8 OLI/TIRS (30 meter) resolution



Fig.5

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different minerals is known to lead to water pollution due to heavy metal, acid discharge and increase suspended solids. Deep underground mines directly affect the water table of the area. Due to the mining products and waste which was transported by vehicles and external forces and left in the water bodies as a result of which colour of the water become reddish and depth of the water bodies has decreased due to deposition of residual materials of mine. Considering these aspects, researcher measured the colour and siltation of the water bodies located within a radius of 5 and 10 kms. Generally the impact on any components decreases as we go away from mining area. In 1991, 436.75 hectares of area of the water bodies got silted within a radius of 10 km, in 2001it has slightly decreased to 325.24 hectares

and in 2011 it has increased to 411.7 hectares (Table 4). It has been recorded that the fallow land has increased to12, 860 hectares in 1991, 19261.37 in 2001 and 17599 hectares in 2011 (Fig. 4,5,6,7& 8). The main cause for this increase was mining waste illegally dumped in agricultural land taken from land holder on lease base and extraction of ore in agricultural land, once the ore content exhausted from such land it became unproductive and this land is left uncultivated for about four to five years. During the study period (3 decades) the data on forest area shows the decreased trend within 5kms and 10 kms as well. Similarly agricultural land with irrigation has also declined from 21,882 hectares in 1991 to 13,850 hectares in 2011 (Table3). It can be summarized that the excavation of mine certainly not an

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eco-friendly activities, however, the activity has its own significance in respect economic development. But a lot of care has to be taken to protect and manage the environment for the generation to come in future.

Concluding remarks

Mining and associate activities impact all the components of the environment. Extend and magnitude of the impact varies according to the nature of the mining activities and the status of the prevailing environment. The result

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of the present investigation manifest that the environmental conservation measures when implemented systematically would mitigate the effects due to excavation and other mining activities in the iron ore mining regions of Bellary district. The surface runoff water effected the quality and quantity of the water bodies. The overburden and mining dump can be made more hospitable for harboring vegetation which controls the pollution. Selection of suitable place for dumping the over-burden away from the water sources is an obligatory pre-mining operation requirement. A shelter belt of suitable tree species reduces the wind velocity and the air - borne dust. Modification of taxation policy, leasing system and imposing expert quotas are also necessary to improve the deteriorating situation in mining areas. All this can happen only if there is continued effort to spread awareness amongst the common public, especially about their rights and also the importance of surrounding environment in the overall welfare of the region at large and society in particular.

Acknowledgement

The data and information used in this research paper are taken from the ongoing UGC Major Research Project entitled" Environmental Consequences in the wake of iron ore mining of Bellary District, Karnataka: Using Geo- Spatial techniques". Therefore, the author express his sincere thanks to the University Grants Commission, New Delhi for providing the financial assistance to carryout MRP.

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National Geographical Journal of India, An International Peer-reviewed and refereed Journal of India (NGSI-BHU, ISSN: 0027-9374/2016/1578), vol. 62 (1), March: 75-88

Crimes against Women in Varanasi City: A Geographical Analysis

Ravi S Singh and Rashmi

Crime against women is partly a result of unequal gender relations that assume men to be superior to women. Women are subjected to rape, abduction, dowry death or their attempts, torture both mental and physical, sexual harassment and trafficking. As per the official data, general reported cognisable crimes have increased in recent years; the rate of increase of those against women is faster. The present study is an attempt to understand the nature of crime against women in Varanasi City in recent past (2009-2013). It is based on crime reporting in the print media. According to the data collected, dowry deaths and abductions were most and least reported crimes in Varanasi city, respectively, during the study period.

Key Words: City, Crime, Rape, Sexual Harassment, Women

Introduction

Crime is a surface expression of discontents which lie deeply embedded in the social system. Like any surface manifestation, crime can provide clue(s) to the particular forces which causes it, these in turn, may be traced to the deeper contradictions which churn in the guts of the social and economic system (Peet, 1975). Crime leaves deep scars in the society; therefore, we need to study the nature, causes, and patterns of crime affecting people and their property to find out the reasons behind them and prescribe measures to curb such incidences.

The geography of crime is interplay between crime, space and society through the analysis of offences, offenders and the end effects (cf. Harris, 1974). Crime involves rule breaking while violence involves intentional harm-doing using physical means. Violent crime involves both crime and violence (Ahuja, 1989:74).

The crime against women reduces their efficiency. Fear of crime is a cause of women's non-participation in many spheres of life. Further, it has far-reaching consequences for women, their children, and society as a whole. Victims suffer a range of physical, mental, and health problems, and their ability to earn a living and to participate in public life is diminished. Their children are more at risk of health problems, poor school performance and behavioral disturbances. Crime thus impoverishes women, their families, communities and nations (Ibid.). Crimes against women are broadly classified under two categories: the first category includes crimes identified under the Indian Penal Code (IPC),

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such as, rape, kidnapping and abduction, dowry homicides, torture-physical and mental, molestation, eve-teasing or sexual harassment, importation of girls, and murder (other than dowry homicides); and, the second category covers crimes identified under the special laws (SL), such as immoral trafficking, demanding dowry, and indecent representation of women.

Taking into account both Indian Penal Code (IPC) and Special and Local Laws (SLL), the incidences of crime have consistently risen during 2008-2012. A total of 2,44,270 incidents of crime against women were reported in the coun-try during the year 2013 as compared to 2,28,650 in the year 2012 recording an annual increase of 6.4 percent in the same period. As per the National Crime Records Bureau (NCRB) data, Uttar Pradesh, accounting for nearly 16.7 percent of the country's women population, recorded 10.5 percent of total cases of crimes against women in the country. Eastern Uttar Pradesh and Varanasi too show increasing trend in this regard.

Literature Review

Crime is an outcome of the negative effect of a society (Mukherjee, 2005:5). As held by some, the concept of crime is a relative one and it varies in accordance with the socioeconomic development of the society and is reflected in the moral and social values of a community. Cohen (1941) explained how climate and seasons affect the crime rate. He found that the crimes against persons are always more numerous in the summer and the crimes against property are more numerous in winter. Cohen's study provided a clue to the fact that geography of a region plays significant role in crime against women. The study by Herbert and Smith (1979) explored empirical identification of the spatial incidence of social problems. Problems arise only when social reproductions are frustrated, retarded or prevented. The focus should be on the entire economic and social formation for it is only in this context that problems can be identified and understood.

Valentine (1992) explained the issue of mental maps that women create in their minds of places which they feel would be dangerous. This study gave emphasis on the concept of use of space by women, both in the context of fear and the constrained space which is available to her, due to patriarchy. Smith (1994) demonstrated that crime reflects the organization of the built-up environment, the spatial structure of social relations and also the distribution of power and wealth. Through the previous studies, it is evident that crime is both spatial as well as temporal in nature. However, crime also differs from region to region. So, it must be noted that 'no correct scientific theory of criminal behavior is possible.'

There is ample literature on crime in India and several new works available on crime against women. Yet, spatial studies on crime are few and those on crimes against women are negligible. Flavia Agnes (1992) dealt with the legislation or the laws of the country, which protect the women and its impact on the status of women. However, in spite of such reforms much is necessary to be done about safety and status of women.

Kelkar (1992) provided with an overview of the approach of women's movement in India to the problem of violent crimes against women. Women's collective actions have effect on male violent crimes and cultural control within the intimate terrain of the family. So, crime against women has to be studied in the socio-economic and political context of power relations. Singh (1996) in his district level study mapped important crime heads and tried to analyse the socio-economic correlates of crime. Dutt, Pomeroy and Wadhwa (1998) analysed the crime pattern changes in large cities of India with special reference to Mumbai and Varanasi. This study explains that when a crime behavior is established and criminals are rooted in a city, nature of crime changes with the change in situations. Sharma and Chowdhary (2012) analysed the spatial pattern of crime in Shimla city. The purpose of spatial analysis is to identify pattern in geographic data and attempt to explain these patterns. This study reveals the importance of geographical phenomena in analysis of crime pattern. Singh (2012) in her study extracted the inference that the development variables do not play effective and significant role in inhibiting the criminal instances.

Urban Crime: A Conceptual Framework

In the backdrop of above select literature review, it is possible to build a framework for the present study. The concentration of huge population due to urbanisation often leads to squalid and congested settlements. Congestion due to urbanisation encourages deviant behavior, spreads diseases, creates conditions of mental illness, crime and alcoholism, etc. Such settlements have a large unemployed and underemployed population, which in turn leads to poverty, low social status, crime and other vices (see, Figure 1). Urban crime is result of deteriorating social fabric in families, material deprivation, frustrated aspirations, boredom and anger (Pacione, 2009: 314). Modern cities present a meeting point of people from different walks of life having no affinity with one another.

Like many other problems, crimes too increase with the increase in urbanisation. In fact the increasing trend in urban crimes tends to disturb peace and tranquility of the cities and make them unsafe to live in, particularly for the women.

Overcrowding, congestion of urban dwellings, habitat destruction, creation of nonlegal zones, lack of appropriate urban policies and planning, basic amenities to all sections of societies, adaptation in the process of urbanisation and un/underemployment act as contributing factors towards urban crime (Figure 1). Overcrowding of cities due to increasing population creates adverse condition of survival for the weaker sections of the society. These adverse conditions motivate them towards antisocial activities and hence add up to urban crime. It is becoming more complicated in current situation because criminals often get shelter from politicians, bureaucrats and leaders of the urban society (Dutt et al., 1983). Urbanisation represents complex socio-economic and political forces as well as a distinct local culture and history which also portray the inferior status of women. It apparently raises the status of women as compared to the rural areas; however, the gender-based discrimination only changes its forms (Mukherjee, 2005 : 26). Urban crimes like rape, murder, kidnapping, dacoity, robbery, sexual harassment, molestation etc. are getting more pronounced in present days.

The geography of urban crime can add a dimension, hitherto largely neglected, to the broad field of criminology. However, the geographical perspectives have no special claims in relation to problem-solving but rather offer a limited and partial role which must ultimately be fused with the roles offered by



Figure 1. Contributing Factors of Urban Crime

other disciplines in the attempt to understand the phenomena being investigated (cf. Herbert, 1982: 2).

Objectives, Data Source and Methodology

The present study is an attempt to make an analysis of crimes against women in the holy city of Varanasi in the regional context of Eastern Uttar Pradesh. It has the following two specific objectives:

To map the general crime profile; and,
To analyse the nature and composition

of crime against women in Varanasi City.

The work has been carried out with the

help of both primary and secondary data. The data in the District Statistical Handbook, Varanasi gives detailed information regarding population characteristics that have bearing upon crime. Details regarding various aspects of crime have been collected from the National Crime Records Bureau (NCRB), New Delhi and substantiated with information from print media, especially two Hindi daily newspapers, viz. *Dainik Jagaran* and *Rashtriya Sahara*, published from Varanasi, for micro level analysis.

Results and Discussion

Regional Scenario of crime: The issue

Table 1a. Crime against Women in Eastern U.P. and Varanasi district: A Comparative Scenario,2008-2012

Crime Head	No. of Report Eastern U.P.	ed Cases ¹ Varanasi District	Share of Varanasi District (%)
Rape	1237	63	5
Dowry Death	1871	126	6.7
Molestation	1459	99	6.8
Sexual Harassment	1589	115	7.2

Note: 1. Per lakh female population.

Table 1b. Crime against Women in Varanasi District and Varanasi City: A Comparative Scenario,2008-2012

Crime Head	No. of Report Eastern U.P.	ed Cases ¹ Varanasi District	Share of Varanasi District (%)
Rape	63	39	62.1
Dowry Death	126	67	52.9
Molestation	99	61	61.6
Sexual Harassment	115	31	26.9

Note: 1. Per lakh female population.

(Source: Based on Crime in India, 2008, 2009, 2010, 2011, 2012)

of crime against women in urban areas has drawn significant attention among national governments across the world, irrespective of their development stage, as well as among international agencies, as a part of their concern for human security and, more importantly, in the context of the larger issue of human rights. It is a paradox that in spite of these measures women still remains a major victim of the crime in urban areas. Law enforcing and other related agencies have no idea of the actual volume and magnitude of the problem. The study conducted in the context of regional pattern of crimes in Eastern Uttar Pradesh, in which Varanasi is located, reveals that Varanasi district reported highest percentage share of sexual harassment

(7.2%) followed by molestation (6.8%), dowry death (6.7%) and rape (5%) (Table 1a & b). The reason behind this fact may be associated to the integration of rural and urban lifestyle and rapid urbanisation in Varanasi district (Kumari, 2008: 85-94). The process of urbanisation deeply transforms a societal environment through far reaching changes in urban scenario along with their human values and norms. Traditionally, women were confined to their conventional roles. Due to influences of urbanisation and modernization women are breaking away from the given traditional roles, and are increasingly participating in all walks of life. These changes that the urban life brings into the life-style of women as well as the social





ethos raise some forms of unacceptability between the traditional norms and the modern mindset within the family and do generate various forms of conflicts that in extreme take the form of crime against women (Vauquline, 2012).

If we see the spatial distribution of crimes against women in Eastern Uttar Pradesh, then

Year	Total Population (persons)	Sex Ratio ¹	Female Literacy (%)
1951	5,00,000	833	39
1961	5,50,000	828	45
1971	5,55,000	842	51
1981	7,00,000	858	55
1991	9,05,000	868	61
2001	12,60,571	876	64
2011	15,80,194	899	68

Table 2. Changing Status of Women inVaranasi City, 1951-2011

Note: 1. No. of females per 1000 males (Source: *District Statistical Handbook, Varanasi, 2011*)



■ Male ■ Female

Figure 3. Sex-wise Occupational Structure of Varanasi City, 2011 (%)

(Source: Drawn on the basis of District Statistical Handbook, Varanasi, 2011)

it is found that Allahabad and Gorakhpur are the hotspots of crime against women in Eastern Uttar Pradesh followed by Bahraich, Gonda, Jaunpur, Pratapgarh and Sonbhadra (Figure 2).

Rapidly expanding urban settlements in Allahabad and Gorakhpur has given rise to insecurity of women, as revealed by media reporting. Urbanisation, which in one way is an impact of large population migration, also leads to high incidences of offences against women. In urban areas, there is a higher male population due to male-selective migration from their original place of residence for employment. Hence, in these cities more often there are small families or single units. Only a few migrants know each other and there are hardly any social ties. This creates a sense of anonymity. Besides, urban life leads to high level of stress. So, crime and crime against women are the culmination of urban living (cf. Mukherjee, 2005).

Varanasi City: Gender Realities and Crimes

Status of gender does not imply rank or hierarchy but denotes only position vis-à-vis condition in terms of rights and obligations of women and men. Social, cultural, historical religious practices and values are the important determinants of women and men's status in the society. Class, caste, ethnicity and race also influence the status of women and men. Therefore, it is difficult to view emerging trends of society in isolation (Bano, 2012: 65). Age and sex composition of a population is considered as reflection of the concern society. For example, a balance sex ratio indicates healthy status of a society whereas any imbalance in this regard may lead to a number of social problems including some crimes.

Varanasi city's population composition shows a masculine character. However, the number of females per thousand males has been increasing at a slow but steady rate (Table 2) since last six decades. The reasons for increase in the sex ratio are the change in attitude of people towards female child, employment of women, their increasing literacy, and abolition of *purdah* ('veil') system and other socio-economic and cultural factors which emerged through ongoing process of development in the city and the region in general.

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Overall share of women in workforce participation is high in primary activities and household industry in Varanasi city (Figure 3). Approximately 54 percent of working females are engaged in household industries as well as in primary activities. Due to lack of mobility, lesser access to resources and socio-cultural restrictions, their share is still less in other than household industries. Whereas male participation is comparatively higher in such activities (e.g., trade, commerce and transport, etc.). This once again indicates the masculine structure of the society. Women handle household activities more than their men counterparts, but when we talk about decision making process, their participation is reported to be lesser in Varanasi city (cf. Bano, 2014). Gender differences led to the suppression of

Table 3: Crimes against Women in KAVAL Cities: A Comparative Scenario

City	No. of In	No. of Incidents (Per Lakh Female Population)						
	Rape	Dowry Death	Molestation	Sexual Harassment				
Kanpur	280	513	615	513				
Allahabad	207	320	330	320				
Varanasi	58	126	99	126				
Agra	218	369	592	369				
Lucknow	290	448	780	448				

(Source: Based on Crime in India, 2008, 2009, 2010, 2011, 2012)



Year

Figure 5. Crime against Women in KAVAL Cities: A Comparative Scenario (Source: Based on *Crime in India*, 2008, 2009, 2010, 2011, 2012)

women's voice in the decision making on various issues occurring in their daily activities including crime. Men, as grandfather, father, father-in-law, husband, son and even grandson, always control the sphere of women's life. This social notion, amply determines work pattern, and reflects the biased gender inequalities when men are in power and women are exploited by the former in own interest. This type of situation shows the social insecurity and less resistance power of the women and crime starts with suppression of women. It is committed to prove or feel a sense of power maintained as an instrument of coercion. Any individual or group facing the threat of coercion or being disciplined to act in a manner required by another individual or group is subject to crime (Krishnaraj, 2007).

Approximately 45 percent of total female population of Varanasi district resides in Varanasi city. The general pattern of distribution of female population is shown in the Figure 4. The concentration of females is higher in old city area and found to be gradually declining as one moves away.

If we compare the incidents of crime against women in Varanasi with KAVAL cities then we find the Varanasi city comparatively safer with less number of incidents of crime against women but the fact remains that only

Table 4. Incidences of Crime against Womenin Varanasi City (2008- 2012)

Crime heads	No. of incidence per 100 female population
Rape	39
Dowry death	67
Dowry death attempts	27
Abduction	21
Molestation	61
Sexual harassment	31
Total	246

(Source: Based on newspaper reporting)

Varanasi is showing increasing trend among KAVAL cities and higher percentage share of Varanasi city to rest of the district is due to rapid urbanisation and development leads to unsafe city environment. Among KAVAL cities Kanpur is the most vulnerable city for crime against women followed by Lucknow, Allahabad and Agra (Table 3, Figure 5). These cities are becoming more and more urbanized, industrialized and modernized but the development of women is not taking place parallel.

As noted above, the higher concentration of females is in old city area which gradually declines outer ward, should have bearing upon victimization of women and types of crime against women. As we move from central zone of the city, incidents of dowry death is more prevalent over there (Figure 7). The reason behind these facts can be attributed to the prevailing customs and rituals forcing girls towards marriage. It is considered as an important social institution. It is assumed that marriages are bond between two families, rather two individuals, arranged marriages and dowry are customary. This society is predominantly patriarchal. There are stringent gender roles, with women having a passive role and husband an active dominating role. Marriage and motherhood are the primary status roles for women. In the setting of such customs, many of the social values take their



Figure 6. Varanasi City: Incidences of Crime against Women by Age Group, 2008-2012 (Source: Based on newspaper reporting)





ugly forms like the abuse of anti-dowry law and dowry death, societal norms are powerful and often override the legislative provisions in real life situations. Other than this, there is very less reporting of sexual harassment and molestation cases in that areas due to social taboo about these incidents.

On the whole it can be seen that cases

on dowry death is higher in comparison to other crimes against women in Varanasi city because of relatively low literacy rate (64.2%).The highest percentage (64%) of victims was from the age-group 25-35. This age group is more vulnerable to being victim of dowry deaths and dowry death attempts. 45 percent victims were from the age group 15-25 (Figure 6).

This age group is more vulnerable to rape, molestation, sexual harassment and abduction for various purposes. The results show that some of the underlying factors for increased reports of molestation and sexual harassment against women in Varanasi city, like patriarchy, education and employment for women and gendered power inequalities are in a complex interplay. It was further seen as 'traditional' norms and values clashed with 'modernity' and caused these factors for crime.

Conclusion

The aforesaid discussion clearly indicates that crime against women is consistently rising in Varanasi city from the year 2008 to 2012. Despite the fact that female literacy rate and sex ratio have registered an increase, the city also holds the dubious distinction of having an ever increasing rate of crime against women. This can be attributed to the clash between traditional social norms and values, and 'modernity'. The discussions with respondents revealed that 'archaic and orthodox mentality' of the city dwellers is being challenged by modernity culminating into crime against women.

On the basis of brief analysis attempted above, it may be concluded that the majority of victims are subjected to dowry deaths, molestation, rape and sexual harassment. A trend of young girl victimisation can also be seen. Women between the ages of 25-35 years form the most vulnerable lot. However, more often than not crimes against women go unnoticed. This is mainly due to the fact that the victims lack the courage to come out and share their plight with others. Even if these women desire to take steps against the atrocities, their families are not willing so. Societal bounds and the sense of shame act as a barrier. So, there is immediate need to educate the girls about their safety and encourage them to speak out against harassment and other issues related to crime. But, everything is futile if conscience of the common city dweller is not supportive.

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National Geographical Journal of India, An International Peer-reviewed and refereed Journal of India (NGSI-BHU, ISSN: 0027-9374/2016/1579), vol. 62 (1), March: 89-100

Calculating Multidimensional Deprivation Index for Women Living in Slums of Varanasi City

Darshan Kumar Jha, Rahul Harshwardhan, V. K. Tripathi

This paper is an attempt to calculate Multidimensional Deprivation Index (MDI) for Women living in slums on the basis of versatile methodology of Multidimensional Poverty Index (MPI) which can be readily adjusted to incorporate alternative indicators, cut-offs and weights that might be appropriate in local contexts. Life is hard in slum where no basic facilities are available and it is much harder for women who are responsible for household, children and family members. Total ten indicators have been chosen from three sectors (health, economic and working status, value in family) to determine deprivation of female slum residents. The present study is based on Primary data which has been collected from six different slums of Varanasi city. The paper reveals that the more than 50 percent women living in six surveyed slums are multidimensionally deprived but spatial variation can be identified across all slums and across all indicators. The paper also identifies three different categories of slums on the basis of their deprivation score C.

Keywords: Multidimensional Deprivation Index, Slum, Urban Poor, Women

Introduction

India is urbanising rapidly and urbanisation exercises a growing influence on all aspects of society, reflecting the nature of economic and regional development. Although the urbanisation process is widely acknowledged to be associated with increasing levels of national production and higher levels of per capita GDP, poverty remains a persistent feature of urban life in India.

The word "slum" is often used to describe informal settlements within cities that have

inadequate housing and miserable living conditions. The main reason for slum proliferation is rapid and non-inclusive patterns of urbanization catalysed by increasing rural migration to urban areas (State of Slum in India, 2013). According to Registrar General of India Office (2011), slum is defined as "a compact area of at least 300 population or 60-70 households of poorly built congested tenements, in unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities".

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Slum life is never easy for the urban poor in so far as housing and living conditions are concerned. Among the urban poor, the children, women and old age population are most vulnerable. Life is hard in slum where no basic facilities are available and it is much harder for women who are responsible for household, children and family members. In such worse condition women while taking care of other family members gets deprived of own basic necessities like nutritious food, health etc and this deprivation transcends into many problems related to health, hygiene, education, social security etc. Women status in society implies their status in social, political and cultural areas and is determined by access to basic social services, education, information, quality, health services.

Hundreds of study and researches have been done on status and quality of life of women in slum in India. Still more study is required to know the real condition. In India, slum population sex ratio jumped from 887women for every 1000 men in 2001 to 928 in 2011, a significant improvement compared to the jump in sex ratio for the rest of the urban population sex ratio from 904 in 2001 to 929 in 2011.In terms of migration, for women the phenomena of urbanization and growth of city slums addressed by academics advocates alike, and there is limited data on woment and urbanisation. Socio-economic condition of slum women is usually critical, pathetic than nonslum areas. Status denotes position of a person vis-a-vis the person rights and obligations (Pande, 2005). Goswami & Manna (2013) discusses about strong linkage between attaining economic prosperity and enriching the quality of life, which is reflected in the social indicators of health, longevity, literacy and environmental sustainability and present a pathetic picture of slums dwellers live under the most deplorable conditions. The study of Mittal and Ketkar (1970) reveals that the socioeconomic factors such as education, religion, place of residence, and standard of living, are some important factors, which dent an influence on individual personality. Raju and Bagchi (1994) integrate different scales of analysis and combines economic explanations with local dimensions such as religion, culture, and societal constraints on gender roles in South Asian countries. According to report of Human Habitat (Voices from Slums, 2014), women of the slums represent one of the strongest forces for the development of millions of urban families living in poverty. They take care not only of the different household members but often they are also the main bread-winners. Jha and Tripathi (2014) argues that the situation of slums is worst in developing countries like India and present a pathetic picture of life in slums of Varanasi due to uncontrolled and rapid urbanization.

For analysing Quality of Life of different sections of society various scholars and agencies developed various quality of life and poverty indices across the world. Morris has tried to study the Physical Quality of Life Index (PQLI) with the help of three component indicators of infant mortality, life expectancy and basic literacy. PQLI is called a direct forerunner of today HDI and is classified under economic perspectives to QOL (Sirgy et al. 2006). HDI as developed by United Nation Development Program (UNDP) is most popular index of quality of life. It summaries the level of human development attain by a country. It is compound of sub-indices relating to health, education and income at national level

of aggregation (Narayana, 2008).

The Multidimensional Poverty Index (MPI) is an index designed to measure acute poverty. The MPI measures the level of multiple deprivations and take into account two elements to measure acute poverty: the incidence of poverty or the proportion of people who experience multiple deprivations, and the intensity of their deprivation -the average proportion of (weighted) deprivations. After the work of Smith (Human geography: A welfare approach) in 1977 geographers began to take interest in the study of social well-being. In this globalised world where economic growth and disparities co-exist, the study of multidimensional poverty and deprivation of female slum dwellers become more significant. This paper is an attempt to calculate Multidimensional Deprivation Index for Women living in slums on the basis of MPI following the methodology of Alkire and Foster (2008, 2011).

Database and Methodology

The present study is based on Primary data which has been collected from six different slums of Varanasi i.e. Nagwa, Mandudih, Bajardiha, Omkareshwar, Sigra and Durgakund through interview schedule based field survey (fig.1).

This Multidimensional Deprivation Index (MDI) is based on lines of versatile methodology of Multidimensional Poverty Index (MPI) which can be readily adjusted to incorporate alternative indicators, cut-offs and weights that might be appropriate in local contexts. It is notable that the MDI measures both the incidence of deprivation (the proportion of people who experience multiple deprivations) and the intensity of their deprivation, the average proportion of (weighted) deprivations they experience.

To measure acute deprivation of women living in slums (multiple deprivations) ten indicators belonging to three dimensions: health, economic & working Status and value in family has been chosen (Box 1). Each woman is assigned a Deprivation Score C according to her deprivations level in the component indicators. The deprivation score of each woman is calculated by taking a weighted sum of all deprivations, so that the deprivation score for each woman lies between 0 and 1. The score tends to increase as more and more woman are deprived and attains highest score of 1, when a woman is deprived in all component indicators. A woman, who is not deprived in any indicator, scores a value equal to 0.

Formally: $C_i = w_1 I_1 + w_2 I_2 + \dots + w_d I_d$ where Ii = 1 if the person is deprived in indicator *i* and Ii = 0 otherwise, and w_i is the weight attached to indicator *i* with $T^d_{i=1} w_i = 1$

In this methodology, a woman is considered as deprived if her deprivation score is equal or greater than the deprivation cut-off. Formally in the MDI, a woman is identified as deprived if she has a deprivation score higher than or equal to 1/3. In other words, her deprivation must be no less than a third of the (weighted) selected indicators, which is to be considered for MDI. For those whose deprivation score is below the poverty cut-off, if it is not 0, then it can be replaced by 0"; this is called as censoring in measurement. It follows Alkire and Foster (2008, 2011) methodology which has a flexible structure and can be adapted to other specifications.

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Fig. 1

Box 1: Indicators of Multidimensional Deprivation Index and their Weights

- 1. Health (Each indicator is weighted equally at 1/12)
- i. Number of Children per Women: Deprived if more than 4 children.
- ii. Place of Delivery: Deprived if usual place of delivery is home.
- iii. Use of sanitary Pads: Deprived if don't use sanitary pads.
- iv. Age of Marriage: Deprived if get married before age of 17 years.
- 2. Economic and Working Status (Each indicator is weighted equally at 1/9)
- i. Per day Income: Deprived if earn less than Rs. 150 per day.
- Equal Salary/wage: Deprived if don't get equal salary/wage to their male counterpart
- iii. Work Participation: Deprived if not engaged in any economic activities.
- 3. Value in Family (Each indicator is weighted equally at 1/9)
- i. Participation in decision making: Deprived if don't participate in decision making process of household.
- ii. Torture by Husband/Family: Deprived if mentally or physically tortured by their husband or other family members.
- iii. Illiteracy: Deprived if illiterate.

An Overview of Slums in Varanasi City

Varanasi is one of the million city of India where slum population is much higher (34%) than the national average of (26%) of the total urban population. This 34% of city population occupies only 7% of city land. The rapid growth of slums in Varanasi has put pressure on the existing land resources and infrastructure and has led to degradation of its physical characteristics. The slum population is continuously growing in the city from 1941 (Table 1). According to slum free city plan of Action Varanasi (2013), there are 210 notified slums, out of which 156 slums are found in core area, such as central business districts, around temples and small scale industries. The main reason contributing to this concentration is proximity to work place, religious and tourist destinations.

Results and Discussion

A.Health Indicators: Health of a person shows the level of wellbeing. The slum dwellers are deprived of good health which is essential for work efficiency. Women resides in slums are more prone to diseases and health problems due to poor nutrition and hard physical labour both at home and work. They have to work in besmirched condition which has adverse effect on her health. Female slum dwellers get married at early age and bears delivery at less intervals which deteriorates their health due to deficiency of nutrition. The slums are unhygienic dwellings due to lack of sanitation and sewage system. This leads to occurrence of water borne diseases frequently to women. Majority Table 1 : Growth of Slum Population in Varanasi (1941-2011)

Year	Total City	Slum	% to Total City
	Population	Population	Population
1941	266002	26100	9.8
1951	355771	48300	13.57
1961	489684	69600	14.21
1971	617934	86700	14.03
1981	773865	100812	13.02
1991	1000747	112987	11.29
2001	1170897	137977	11.78
2011	1201815	407036	33.86

Source: Census of India, 2011.

Name of Slum	No. of	$\mathbf{C}_{_{\mathrm{H1}}}$	Place of	$C_{_{H2}}$	Sanitary	C _{H3}	Age of	C_{H4}	Total
	Children		Delivery		Pad		Marriage		Score
	Per		(In %)		(In %)		(In %)		(C_{H})
	Woman								
	(In %)								
Nagwa	23.00	1.92	80.00	6.67	65.00	5.42	22.00	1.83	15.83
Bajardiha	20.00	1.67	80.00	6.67	77.00	6.42	30.00	2.50	17.25
Manduadih	25.00	2.08	72.00	6.00	48.00	4.00	21.00	1.75	13.83
Omkareswar	21.00	1.75	76.00	6.33	72.00	6.00	18.00	1.50	15.58
Sigra	15.00	1.25	68.00	5.67	57.00	4.75	15.00	1.25	12.92
Durgakund	10.00	0.83	72.00	6.00	68.00	5.67	28.00	2.33	14.83

Table 2 : Deprivation Score C_{H} (Health Status)

of slum women are anaemic, low in weight and nutrient deficient at the time of pregnancy which leads to poor health of the newly born baby and sometime infant mortality.

Table 2 explains the condition of the women in the sample slum of Varanasi. The Deprivation Score C_{H1} (No. of Children per Woman) of Manduadih is highest (2.08) while lowest is in Durgakund (0.83). This reveals that the women of Manduadih are more deprived than others. The condition of women resides in Nagwa, Bajardiha, Omkareshwar, Sigra are relatively better than that of Mandudih. The women of Manduadih has more children which implies poor health condition and nutrients deficiency diseases like low weight, anaemia etc. It also reflects that they got married at early age, coupled with non-participation of women in family planning and not using contraceptive to prevent undue pregnancy. The women of slums other than Durgakund have more children because they are either not employed or employed as casual labour like household worker, construction site worker etc., while the women of Durgakund are employed in formal sector like sweeper of Municipal Corporation or work in private hospitals and institution having fixed salary and availing health services and aware about family planning measures.

The Deprivation Score C_{H2} (Place of Delivery) is found highest in Nagwa and Bajardiha is highest (6.67) and lowest is in Sigra (5.67). This indicates that majority of delivery takes place at home in Nagwa slum whereas significant number of delivery of women is institutional in Sigra. This is because of the proximity of the maternity centre and awareness among the women for safe delivery. The low income and orthodox opinion of the illiterate women and cultural orthodoxy of society restricts them to go for institutional delivery. They fear to go hospitals either because of change of their child or bad behaviour of the nursing staff. The condition of Omkareshwar, Manduadih and Durgakund are more or less similar, but still majority of delivery take place at home due to economic constraints and rigid attitude following the age old practices. The home delivery sometimes leads to either death of child or mother due to negligence and unhygienic process of delivery

by traditional methods (Table 2).

The Deprivation Score C_{H3} (Use of Sanitary Pad) is found highest in Bajardiha i.e. 6.42 while lowest in Sigra i.e. 4.75. This shows that the female slum dwellers of Manduadih are more aware about the benefits of sanitary pads and hygiene in comparison to other slums. In Bajardiha slum, majority of women are not using sanitary pads because slum is mainly dominated by the Muslim community. The women of this community are *illiterate* and don't use sanitary pads because of their religious orthodox belief. Similar condition prevails in Omkareshwar slum. In slums of Nagwa, Sigra and Durgakund majority of women are not using pads due to economic constraints and unawareness about its benefits. For sanitary pads women of slums mostly depends on the NGO's who distribute pads at free of cost but it is found that these NGO's do not distribute pads regularly. A woman who earns or aware about its benefits uses such pads. This deprivation leads to poor health, sexual diseases and sometime even death (Table 2).

The Deprivation Score C_{H4} (Age of Marriage) is found highest among the women of Bajardiha and Durgakund i.e. 2.50 & 2.33 respectively and lowest among the women of Sigra i.e. 1.25. The main reason of early marriage in Bajardiha and Durgakund slum is the prevalence of illiteracy. The women in both the slums got early married because of family pressure and due to the religious custom and practices. Bajardiha is dominated by Muslim community and Durgakund is dominated by SC community, both are socially deprived communities hence they are not keeping pace with the changing societal practices. Women of Nagwa, Manduadih, Omkareshwar and Sigra are less deprived in terms of marriage

because they enjoy freedom to take decision to some extent in comparison to woman of Bajardiha slum (Table 2).

B.Economic and Working Status: The economic and working status of slum women reflects the economic independence and level of freedom exercised by her. The women of slum works in compulsion because either the male member of family is idle or the earning of household is not sufficient to meet the basic necessities. The female slum dwellers work in informal sector as household assistant, casual worker, construction worker etc. The small scale industries such as embroidery, tailoring, handicrafts etc also engage female slum dwellers. The woman has to face many problems at their work places like less wage than their male counterpart, mental or physical harassment. The overall condition of working women of slum is not good but there is significant spatial variation and disparity.

The DeprivationScore C_{E1} (Per day income) is found highest in Nagwa and Bajardiha i.e. 8.67 and 8.00 respectively while lowest in Durgakund and Sigra i.e. 5.86 and 6.11 respectively. This implies that the majority of working women of Nagwa and Bajardiha are getting less wage than the government standard rate. The reason behind less per day income is not having any specific skill and crisis of job. The condition of slum women of Manduadih and Omkareshwar are better than that of Nagwa and Bajardiha but still the majority of women are deprived. The low wage of women manifests into less nutritional food intake and unsatisfactory health and unhygienic condition. The female slum dwellers of Durgakund and Sigra are less deprived than others. The reason is that majority of women of Durgakund are employed in formal sector

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Name of Slum	Per Day Income less than Rs 150 (In %)	C _{E1}	Equal Salary (In %)	C _{E2}	Work Par cipation (In %)	rti- C _{E3}	Total Score (C _E)
Nagwa	78.00	8.67	55.00	6.11	32.00	3.56	18.33
Bajardiha	72.00	8.00	85.00	9.44	40.00	4.44	21.89
Manduadih	68.00	7.56	40.00	4.44	56.00	6.22	18.22
Omkareswar	63.00	7.00	46.00	5.11	48.00	5.33	17.44
Sigra	55.00	6.11	69.00	7.67	36.00	4.00	17.78
Durgakund	53.00	5.89	47.00	5.22	40.00	4.44	15.56

Table 3: Deprivation Score C_E (Economic and Working Status)

either public sector or private sector. Most of women of Sigra and Durgakund are working as household assistant from which they earn decent wage (Table 3).

The Deprivation Score C_{F2} (Equal Salary) is found highest in Bajardiha i.e. 9.44 and lowest in Manduadih slum i.e. 4.44. This reflects that the large numbers of working women of Bajardiha are not getting equal salary while in Manduadih there are only few working female who are not getting equal wage to their male counterpart. The women of Bajardiha are getting less wage than male because of dominance of male population in work. Another reason is those Muslim males who don't recognise the equal pay rights for female. The women of Bajardiha are more deprived in terms of equal salary than any other surveyed slum. In Durgakund, Nagwa, and Omkareshwar, the situation is moderate; half of the female worker gets equal salary to their male counterpart because of the awareness and the recognition of their rights (Table3).

The Deprivation Score C_{E3} (Work Participation) is found highest in Manduadih i.e.

6.22 and lowest in Nagwa i.e. 3.56. In Manduadih, the majority of slum dwellers are converted Christian who recognises the right of women to work. In Nagwa, caste rigidity and considering women to look after home are the major reason of low work participation. In Nagwa, Bajardiha and Sigra, the women are deprived of their right to work of their choice. The male member takes decision in regard of their work and wages. In Omkareshwar, the deprivation level is marginally low but still more than 50% of females are not participating in any economic activity. The condition of women in Bajardiha, Omkareshwar and Durgakund slums is not good but still more than half of women are engaged in work force. This shows that women exercise their right to work and gets support from their family. The less deprivation in respect of work participation provides opportunity to women to skill themselves and to get equal wage as male counterpart (Table 3).

C.Value in Family: This dimension of MDI indicates the position of women in family. It shows the level of freedom and respect

Name of Slum	Participation in Decision Making(in %)	C_{v_1}	Torture by husband (in%)	C _{v2}	Illiterate (in%)	C _{v3}	Total Score (C _v)
Nagwa	22.00	2.44	24.00	2.67	82.00	9.11	14.22
Bajardiha	20.00	2.22	92.00	10.22	40.00	4.44	16.89
Manduadih	28.00	3.11	92.00	10.22	80.00	8.89	22.22
Omkareswar	16.00	1.78	66.00	7.33	68.00	7.56	16.67
Sigra	12.00	1.33	84.00	9.33	48.00	5.33	16.00
Durgakund	24.00	2.67	80.00	8.89	64.00	7.11	18.67

Table 4: Deprivation Score C_v (Value in Family)

women member get from family members. The value in family is being calculated by taking into three parameters of decision making, torture by husband and literacy.

The Deprivation Score C_{V1} (Decision Making) is highest in Manduadih i.e. 3.11 and lowest in Sigra i.e. 1.33. This implies that the significant numbers of women of Manduadih are not taking part in the decision making process while in Sigra few women are found deprived in term of participation in decision making. The women of Nagwa and Durgakund slums are significantly deprived in terms of decision making due to patriarchal nature of family. The position of women of Omkareshwar and Bajardiha are less deprived than women of other slum. They are participating in decision making because they are either employed or literate enough to take decision and to take stand on related issues (Table 4).

The Deprivation Score C_{v2} (Torture by husband or family) is found highest in Bajardiha and Manduadih i.e. 10.22 and lowest among the women of Nagwa i.e. 2.67. The reason behind this is lack of women empowerment and

the women of the slum are not self-dependent. The women are tortured because they are physically and economically weak to resist any type of violence or misbehaviour. The male members with their male ego consider female members inferior to them; they consider it as their right to give physical punishment to female members for any mistake. Some women of Manduadih, Durgakund, Sigra are victim of physical torture by husband because of provocation by their in laws, while some are beaten by their husbands under the influence of alcohol. In recent past women of Bajardiha and Omkareshwar were tortured by their in laws for dowry, which is the most common cause of physical and mental torture among the Indian family. The female slum dwellers of Bajardiha, Manduadih, Sigra are the most deprived while in Nagwa very few women are victim of torturing because they are pro-active in decision making process. They are working which give them a respectable position in family (Table 4).

The Deprivation Score C_{V3} (Illiteracy) is found highest among the females of Nagwa i.e. 9.11 and lowest among the females of Bajardiha i.e. 4.44. This shows that the majority

Name of Slum	C _H (Health Status)	C _E (Economic & Working Status)	C _v (Value in Family)	Multidimensional Deprivation Index (MDI) $C = C_H + C_E + C_V$	Deprivation Category
Nagwa	15.83	18.33	14.22	48.38	Low
Bajardiha	17.25	21.89	16.89	56.03	High
Manduadih	13.83	18.22	22.22	54.28	High
Omkareswar	15.58	17.44	16.67	49.69	Moderate
Sigra	12.92	17.78	16.00	46.69	Low
Durgakund	14.83	15.56	18.67	49.06	Moderate
-	Mean De	eprivation Sco	re C	50.68	

Table 5: Multidimensional Deprivation Index (MDI)

of females of Nagwa are deprived of primary education. Education of women also determines her social and economic condition. In poor families the women has no right to get education and patriarchal mind-set of family consider that only male should be educated because they have to earn bread. The women of Nagwa and Durgakund slum were married at early age hence they are not getting opportunity to attend school. The condition of Manduadih and Omkareshwar is also not good but still better than Sigra and Durgakund. The decision in family is mainly taken by male hence the females are always being deprived of their fundamental rights. It is found common opinion among the family members that a girl has to only take care of other family members and household, so there is no need to educate them (Table 4).

D.Multidimensional Deprivation Index : The overall Deprivation Score C_{H} (Health) is found highest for Bajardiha slum which states that the women of Bajardiha are much more deprived than other slums. The deprivation score of Sigra is very less in comparison to others which reflect that the health of women living in Sigra slum is better than other slums (Table 5).

The overall Deprivation Score C_E (Economic and Working status) shows that the female slum dwellers of Bajardiha are more deprived. The majority of female slum dwellers are deprived of their right of equal wage and right to work because of less job opportunity, skill factor restriction from family and social stigma. Next to Bajardiha, the women of Nagwa and Manduadih are also deprived of good wage and equal salary to their male counterpart. In Durgakund the women are least deprived in respect of economic and working status (Table 5).

The overall Deprivation Score C_v (Value in Family) is found highest in Manduadih and lowest in Nagwa. The deprivation level is high in Manduadih because of high prevalence of illiteracy, early age of marriage and lack of awareness of their rights. The women of Bajardiha, Omkareshwar and Sigra are less deprived but still their condition is not satisfactory.

Table 5 highlight the aggregate deprivation score C which is Multidimensional Deprivation Index for women of slums. The MDI of women of Bajardiha is 56.03 which shows that majority of women are multidimensionally deprived (health, economic status and value in family). Manduadih is at second position where the deprivation score (MDI) is found 54.28. This indicates that more than half of the women are deprived in this slum. The MDI of Durgakund and Omkareshwar is 49.06 and 49.69 respectively, which means near about half of women is deprived. The MDI of Nagwa and Sigra is 48.38 and 46.69 respectively which implies that less than half of women are deprived in terms of their health, economic status and value in family. The MDI of women living in Sigra is lowest in the six surveyed slums. This means the women of Sigra slum are least deprived.

The Mean of Deprivation Score C (MDI) for all sample slums comes 50.68, which reveals that about half of the women residing living in slums are multidimensionally deprived. This high level of deprivation emphasis that much effort is required eradicate the deprivation of women living in slums. The slums of Sigra and Nagwa are categorised as low deprived, Omkareshwar and Durgakund falls under moderate deprived category and slums of Bajardiha and Manduadih are highly deprived slums.

Conclusion

The task of calculating MDI for female slum dwellers has been quite interesting and reveals their multidimensional deprivations. The three chosen sectors and ten indicators present disappointing condition in all sample slums but spatial variation can be identified across all slums and across all indicators. Half of female slum dwellers of sample slums are deprived. In terms of health women living in slum of Bajardiha, in terms of economic and working condition women living in slum of Bajardiha and in terms of value in family women living in slums of Manduadih are most deprived. Apart from this the Mean of Deprivation Scores C (MDI) comes 50.68 which present unsatisfying living condition of more than 50 percent women residents of sample slums. There is a clear spatial variation has been identified and sample slums has been grouped under three different categories on the basis of their deprivation score C.

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