LINKAGES AMONG POPULATION GROWTH, HUMAN DEVELOPMENT, POVERTY AND BIOCAPACITY, ECOLOGICAL FOOTPRINT IN PAKISTAN

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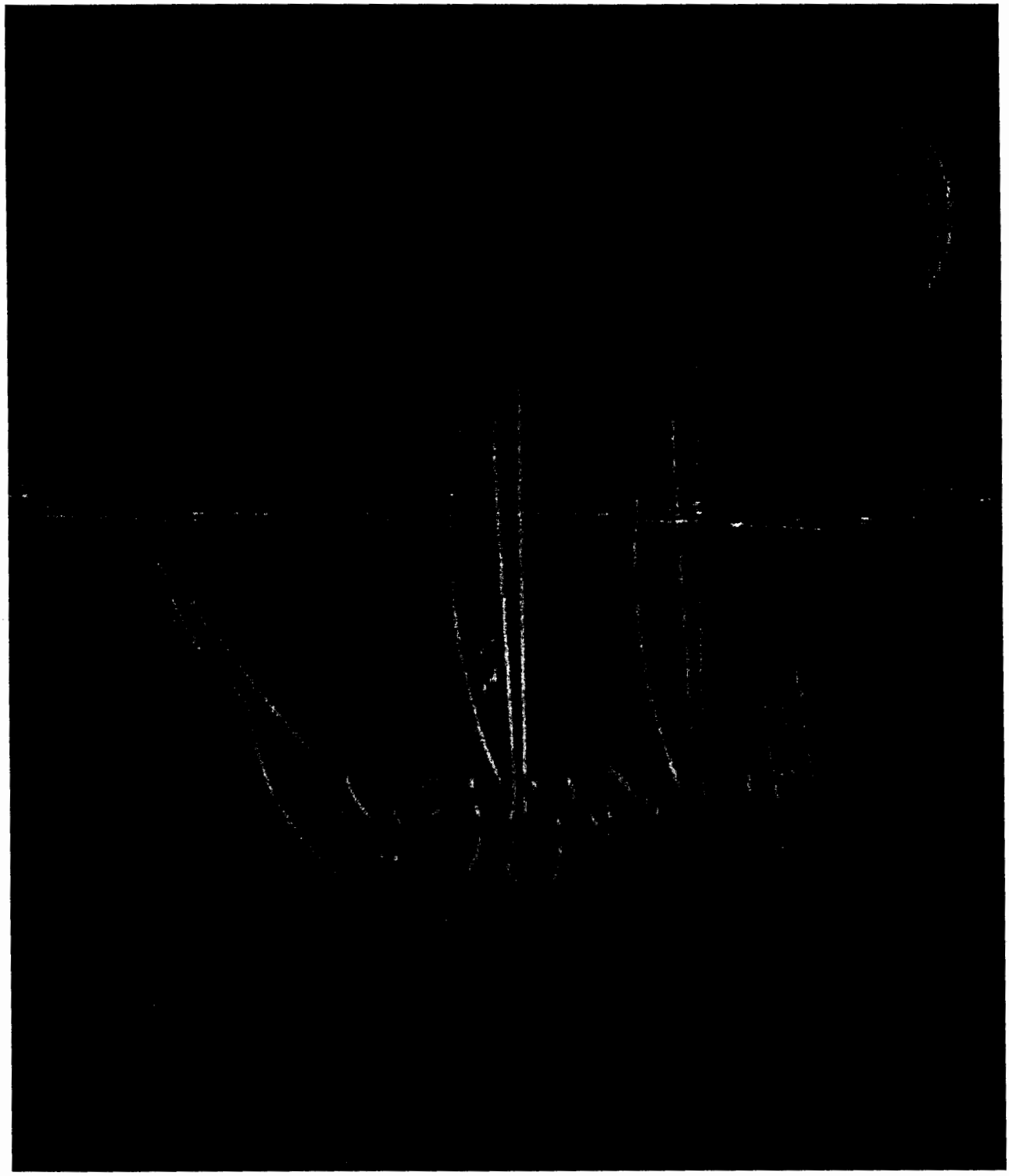

"In the name of ALLAH who is most beneficent and merciful"

I dedicated my work to my

honorable Parents and respectable teachers,

whose Magnificent devotion encouraged

me to achieve this Landmark.

ACKNOWLEDGEMENT

"Read! In the name of your Rabb (Cherisher and Sustainer) Who created— created man, out of a leech-like clot: Read! And your Rabb is Most Bountiful Who has taught (the use of) pen. He has taught man that which he knew not." (Qur'an, 96:1-5)

Firstly, all majesty and admiration is for Allah, the Supreme Being who granted profound determination and ability to accomplish this work.

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ABSTRACT

Emerging population is a prominent subject of concern in present world due to its severe impacts upon all competent sectors for attainment of human needs. Among those integral sectors ecological sector suffered more due to more dependence of human survival, resulting in rising shortfall of this sector.

The aim of this study was to examine impacts of escalating population upon biological reserves of Pakistan along with other issues arose including poverty and reducing Human Development Index. Another aim was to find the comparison of Ecological footprint with Ecological deficit as a result of growing demands by population. Finally; rise in poverty due to increasing rivalry among individuals was also examined in this study.

Research was totally based upon quantitative data. Study was carried out through quantitative analysis of data available through statistics applied on it.

The results of this study revealed that escalating population during previous few decades in Pakistan resulted in reduction of biological capacity due to increasing load of demands. Another finding of this study was increase in population has entailed competition among individuals for resources resulted in rise of economical deprivation led to reducing Human Development Index of Pakistan.

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LIST OF ACRONYMS

Acronyms	Pronunciation
EF	Ecological Footprint
BC	Biological Capacity
HDI	Human Development Index
ED/ER	Ecological Deficit/Ecological Reserve
HDR	Human Development Report
UNDP	United Nations Development Programme
SPSS	Statistical Package for Social Sciences
WCED	World Commission on Environment and Development
SD	Sustainable Development
GDP	Gross Domestic Production
FNO	Footprint Network Organization
PCO	Population Census Organization

Chapter-1

INTRODUCTION

20th century is categorized by boost in population with the progression in technology and other amenities. Humankind depends greatly on natural components for its endurance to convene its biological requirements. In 1987, a conference was organized by WCED, which had developed a joint report "Our Common Future". This report put forward the biggest threats to humanity in future including; economic instability (i.e. poverty), increasing population, climate change and environmental degradation at global level (WCED, 1987). To counter these threats almost all the nations have shown their commitment to sustainable development In this regard, they have developed various strategies. There are several protocols and declarations existing at global stratum to attain sustainable development goals exclusive of harming environmental components and diversity of methods have also been evolved subsequent to SD strategies (Saso, 2005).

The well-renowned definition for Sustainable development specified by the Brundtland Commission is; "the sustainable development seeks to convene the needs, wants and aspirations of the current time generation devoid of compromising the ability to meet up those of the progeny" (WCED, 1987), articulates an ambition for an unbiased intergenerational distribution of resource utilization.

With the growing population, urbanization is also escalating which leads to deforestation to congregate the residential provisions of people and is also thought out to be a major ecological inconsistency, global monetary insecurity is also deliberated to think as upshot of growing population. Urbanization is considered as the key origin of crisis, not only in developing and less developed nations but highly advanced and developed nations are also facing it. Humans presently face harsh environmental challenges at global and local level, and ecological safety is also considered equally to be significant as military, economic, political and national safety, etc. in recent years (Andersen and Lorch, 1998., Hormuth, 1999., Glenn *et al.*1999., Kullenberg, 2002., Ianchovichina *et al.* 2001., Duffy et al. 2001., Albers and Goldbach, 2000., Brummett and Williams, 2000., Luijten *et al.* 2001., Shi *et al.* 2005.,Soffer, 2000., Farmer, 2005., Bonheur and Lane, 2002., Moseley, 2001., Singh, 2000., Lu *et al.* 2003). All the challenges including environment are significantly attached with the emerging population and eventually substantial poverty, one has to think about all these challenges to summon the issues linked with population and poverty. Main focus of this study is to develop a correlation between environmental and human development parameters i.e. Biological Capacity, Ecological Footprint with escalating Population, poverty and Human development index.

1.1 Background of study

Principal focus of this study was to extend correlation among Biological Capacity, Ecological Footprint with escalating Population, Human Development Index and Poverty.

1.1.1 Biological Capacity:

Biological capacity is on the whole carrying capacity of bionetwork (ecosystem). There are several units that come beneath this expression including; forest area for timber, fuel wood, furniture and a large number of other ornamental stuff, crop land, grazing land, fisheries and build up land area for buildings and infrastructure purposes. Each of these bio-units is significant for its distinct characteristics which makes it unique from others. In fact, it is thought to be a natural asset of this earth to provide ecological services, and natural capital for the sustenance of life on this planet.

As the population is growing day by day contradictory to natural system leading to growth in economy, ultimately pressure on bio capacity of this planet, and if it continues at the same rate it will create a succession of incompatibilities along with the deterioration of natural capital, environment, and economic crisis.

1.1.2 Ecological Footprint:

Ecological Footprint was invented by the University of British Columbia's School of Community and Regional Planning in the early 1990s. The idea got eminence by Wackernagel and Rees (1996) in the publication "Our Ecological Footprint–Reducing Human Impact on the Earth". They developed a theory and method to calculate the Ecological Footprint of a nation based on the total of biologically prolific vicinity existing in universal network (globe, kingdom, country, local community, and individuals) so as to make sure its development and endurance (Wackernagel *et al.* 1999). Ecological footprint was developed to assess the biologically fertile territories including diversity of categories such as; rangelands, croplands, marine areas, forest

areas, areas of CO_2 absorption etc. it is a measurement technique to let the traditional measurement techniques for human impacts on these land and marine areas which are vital to sustain the biotic resource consumptions and to maintain carbon emissions for a given population (Wackernagel and Rees, 1995). This calculated Ecological Footprint can be compared with total biological capacity of the productive land area.

In the history of past few centuries it has been observed that productive and economic activities enhanced globally i.e. the extent and eminence of products has intensified even more than population (Saso, 2005) for mounting Ecological Footprint of the entire planet leading to Ecological Deprivation. Besides Human there are so many other creatures depending for their survival on these bionetworks. So alone human is not thought to be responsible for this deprivation of bionetwork. The EF is a modern approach to evaluate the ecological impact of nations across the globe. The legitimacy of per capita EF is also empirically stranded as it was found to be considerably interrelated with key environmental impacts, like emissions of ozone depleting substances and nuclear power production at national level (Prescott-Allen, 2001).

1.1.3 Ecological Deficit:

The Ecological Deficit is thought to be final phase of comparison of Biological Capacity and Ecological Footprint of a nation along with growing Population. This phase gives an idea to indicate the level of attainment of Sustainable Development goals of a nation in addition. It may also help to recognize exploited areas and endow with pathway to develop counteractive strategies to create equilibrium.

1.1.4 Human Development Index:

Human Development Index is a comprehensive depiction of three dimensions including life expectancy, access to natural resources and knowledge to use them. There are three options presented to achieve these dimensions which include; leading people for a long and healthy life, they should have access to resources and should attain the knowledge of their use for civilized living standards (UNDP, 1990). Life expectancy at birth is thought to be considered for prolonged existence and knowledge is taken as the determinant of educational accomplishments on the basis of literacy rate of grown up individuals along with their access to existing resources by their accustomed acquiring power parity GDP per capita.

1.1.5 Poverty:

Poverty is in fact the level of deprivation generated due to unequal distribution of resources i.e. natural as well as artificial. Monetary resources may also be blamed for inaccessibility to achieve a certain level of well being but it is not likely to have only money to conquer well being. Unavailability of natural resources is also considered to be a cause of poverty. In this study two features to define poverty have been considered i.e. Poverty gap at dollars 2 a day and poverty headcount ratio at dollars 1-25 a day.

1.1.5.1 Poverty gap at dollars 2 a day:

Poverty gap at dollars 2 a day is the average inconsistency from the poverty line. This inconsistency can be calculated by finding average income and subtracting this average from poverty line (The World Bank, 2006).

1.1.5.2 Poverty headcount ratio at dollars 1-25 a day:

Poverty headcount ratio is the percentage of population nationwide whose income is lower than the standard set by the government. If there is no poverty line set by the government, it may be defined as the level of income necessary to attain the food along with other basic necessities for endurance (The World Bank Group, 2004).

1.1.2 Study Area:

The area selected for the study is Pakistan as an entire nation. Pakistan has a great deal of geographic and biological significance for the entire sphere (earth).

1.2.1 Geographical Location:

Pakistan is located in the north west of south Asia. On the sphere, it is situated stuck between the latitudes 23.45-degree and 36.75-degree north and between longitudes 61 degree and 75.5 degree east. In the north- west lies Afghanistan. Iran is situated just in the west of Baluchistan province. In the east of Pakistan, India is located and the Arabian Sea lies just in the south. Range of high mountains and plateaus lie in the north and the west, they occupy almost half of the land area whereas rest of area is unadorned (Pakistan Latitude and Longitude, 2010).

1.2.2 Climate:

Climate of Pakistan is characterized by tremendous variations of temperature. Winter temperatures vary from 68°F all along the coastline to 4°F in the towering mountains (above 460 m). Summer temperatures range from 95°F in the southeastern deserts to 32°F in the arrogant mountains (WWFPak.org for a living planet, 2010).

1.2.3 Ecological significance:

Pakistan is thought-out to be tremendously remarkable region pertaining to its ecology and biodiversity ranging from the mangrove forests moving along with the Arabian ocean to the soaring and high mountains of the western Himalayas, Hindukush and Karakoram. (WWF Pak.org for a living planet, 2010). Agriculture is a significant financial activity in Pakistan since most of land area is suitable for cultivation. Along with agriculture; forestry and fishing at small scale are also of greater worth in Pakistan.

1.3 Objectives of study

- To study the evolution of population size and growth of Pakistan.
- To study the evolution of environmental Indices/variables including BC, EF and ED/ER.
- To study the evolution of development indices including HDI and HPI for Pakistan.
- To asses impacts of population growth upon BC, EF and ED/ER of Pakistan.
- To asses impacts of population growth upon HDI and HPI of Pakistan.
- To work out the correlation among environmental and development indices of Pakistan.

1.4 Justification of the study

Population growth is one of the major issues came in front during previous few decades. Growing demands of population let their pressure mounting upon biological competence of Pakistan due to increasing ecological footprint, led Pakistan barer to

crisis seen in the current scenario. Other sectors were also influenced by growing population but focus of this study is its pressure upon bionetwork of Pakistan. This study will help to highlight the issues related to natural balance of Pakistan and will provide a trail to upcoming researchers to work out for crisis stipulation.

Chapter-2

LITERATURE REVIEW

(Cranston, *et al.* 2009). Ecological footprint is designated to as an indicator of resource utilization and incorporation of obscure waste on the basis of per capita available fertile land area with accessible technology. It signifies the computation of the degree to which the whole earth, its region, or nations are moving along a sustainable development track. It shows an inconsistency among nations on the basis of their population, economic development, and geographic uniqueness.

(Jenerettea, *et al.*, 2005). Two outstanding and stand-in approaches are ecosystem renewal appraisal and ecological footprints. These relate the production and assemblage of bionetwork services by means of their utilization by society. Another complementary ambition of both approaches is to support the sustainable utilization of ecosystem services with the intention of their production rates.

(Mustafa, 2010). Intended for environmental sustainability ecological footprint is broadly renowned. Mustafa explained that it tries to enumerate the Earth's biological competence obligatory to sustain human bustle.

(Li, *et al.*, 2009). Anticipating Ecological footprint (EF) is vital for animatedly evaluating human impact on earth over and above to foresee for a sustainable future. The sustainability of future generations greatly depends upon this evaluation which would help in lessening the impact of human activity on ecological systems.

(Schaefer. *et al.*, 2006). The Ecological Footprint is meticulous to be a fraction of a secretarial tool use to deal with the fundamental concern of sustainable utilization of renewable capital of environment. It tries to enumerate the degree to which human race is using nature's resources more rapidly than they can replenish. EF is frequently accessible mutually with bio-capacity (BC), which proceeds all the way through the bio-productive delivery. Ecological Deficit is the mathematical difference between EF and BC.

(Jin, *et al.*, 2009). The Ecological Footprint (EF) is an influential measurement device to precede the art of sustainability. However, the inert snapshot of EF secretarial is not intended to construct projections of future sustainability consequence, which fails to entail policy implication from a vibrant, temporally unambiguous perspective.

(Wackernagel, *et al.*, 2005). Safeguarding the natural capital, inclusively its ability to replenish and redevelop via their individual competency represents a fundamental attribute of sustainability. Consequently consistent and reliable proceedings of supply and demand on natural resources or assets are requisite for steps frontward. Renewable natural resources should be conserved in such a way that consumption is not faster than the rate, they are replaced as well as the conservation activities of non-renewable resources are concerned, it is ensured that adequate supply of these resources is maintained for future use.

(Goll, *et al.* 2006). Countries having a lengthened custom of incorporated green strategy formation are barer to idea of sustainability. It seems obligatory to disseminate this idea of sustainability into all the fundamental areas together with politics and society.

(White, 2007). According to White, human demand for natural capital since calculated by Ecological Footprint is dispersed all through the sphere and is normally used to evaluate the distribution of earnings. Intension of this sharing tends to attain the goals of sustainable and efficient economy.

(Huang, 2006). The rationale to practice the theory or model of Ecological Footprint is to judge the regional ecological safety by the extent of two aspects including capacity and stress.

(Barbour, *et al.* 2000). Ecological integrity is sustained merely through amalgamation of its three fundamental elements; Physical, Chemical and Biological. It helps to reduce the pollution by limiting the use of natural resources, reducing high demands and prohibiting use of toxic chemicals etc.

(Senbel, *et al.* 2003). The Ecological Footprint sets an indirect foundation for bearing the long standing ecological threat and sustainability of human settlements, or regions. Reducing human burning up of ecological products tends to ecological surplus, whereas increasing consumption leads to ecological shortfall or deficit on the basis of ecological yield and consumption.

(Thogersen, *et al.*, 2009). There is a widespread vision existing with reference to environmental challenges, clearly to alter the standard of living, to convene them. This is the era when we necessitate imperative and motivated modification in our living standards. There are social implications of pollution like low-income people do not receive the same protection from environmental contamination as do the high-income communities.

(Sanusi, 2008). Human development index is a measure of human well being. It got popularity with the publication of Human Development Report in 1990 by United Nations Development Program (UNDP). It has become a way of positioning countries yearly with reference to three dimensions of HDI i.e. long life, access to natural resources and knowledge of their use. Basically, HDI offers a multifaceted directory to sum up variety of choices accessible to people.

Chapter-3

MATERIALS AND METHODS

3.1 Study Design

The intention of this investigation is to assess the effects of population growth and HDI on environment. Main issues highlighted in this research are growing ecological deficit due to rising EF, HDI and rise in Poverty due to increasing rivalry among individuals as an outcome of escalating population. Main theme of this study is to correlate all above mentioned variables to get the results.

Pakistan is selected as an area for research. It has greater pledge of significance geographically and ecologically for entire globe. Pakistan is thought to be imperative from strategic viewpoint; all the intensions of the study are specified to biological network of Pakistan but along with the concerns of HDI and poverty.

3.2 Methodology

The current research is based upon secondary data. All information required to conduct this research was obtained through secondary sources depending upon its availability.

3.2.1 Data collection

As study area selected was Pakistan as an entire nation so there was a need to acquire comprehensive detailed information regarding all desired variables. To conduct research more appropriately data was required for almost previous half a century. Data was gathered from various concerned sources depending upon nature of variables. Concerned sources for availability of data of all variables are given as follows;

3.2.1.1 Population:

Data for population growth was obtained from Population Census Organization (PCO). Data was provided for research during years 1960-2005.

3.2.1.2 Evolution of Ecological Footprint, Bio-capacity and Ecological deficit/ecological reserve:

Footprint Network Organization (FNO) is the concerned Organization to get data for evolution of EF, BC and Ecological deficit/ecological reserve. The data was collected for the period 1961 to 2006.

3.2.1.3 Human Development Index and Poverty:

Data regarding HDI and poverty was extracted for Human Development Reports (HDR) of UNDP in Pakistan. Data for both variables was available only for almost 2 decades.

3.2.2 Data Processing:

The data was analyzed using MS Excel and SPSS software.

3.2.2.1 Graphical representation:

Graphical representation of data was done using MS Excel software.

3.2.2.2 Data Analysis:

Focal idea of this study was to correlate variables along with issues related to them with each other. As all data attained was numerical in nature, hence test of Pearson Correlation has practiced to get results from given data. Results obtained through Pearson Correlation have been shown in the form of figures and tables, also geared up by SPSS.

Chapter-4

RESULTS AND DISCUSSION

Environmental alterations arose in the past few years due to communal anthropogenic activities and natural processes altogether. The most vital factor is uneven distribution of natural resources which eventually results in disputes not only environmental but also societal. According to an estimate there are only 20% people who are enjoying the luxurious life style and unfortunately 82.7% of world total income is occupied by them.

Rapidly growing Population push resource consumption near enough to a drastic level and the bionetwork that provides human society with all these resources will no longer stay able to precede this phenomenon (Wackernagel, 2010).

4.1 Representation of data:

For this dissertation, data regarding Population, Bio-capacity, Ecological Footprint, Ecological Deficit Human Development Index and poverty headcount ratio was sought through a variety of sources.

Population of Pakistan has augmented significantly in the previous years. Figure 4.1.1 illustrates population growth during 1960-2005.

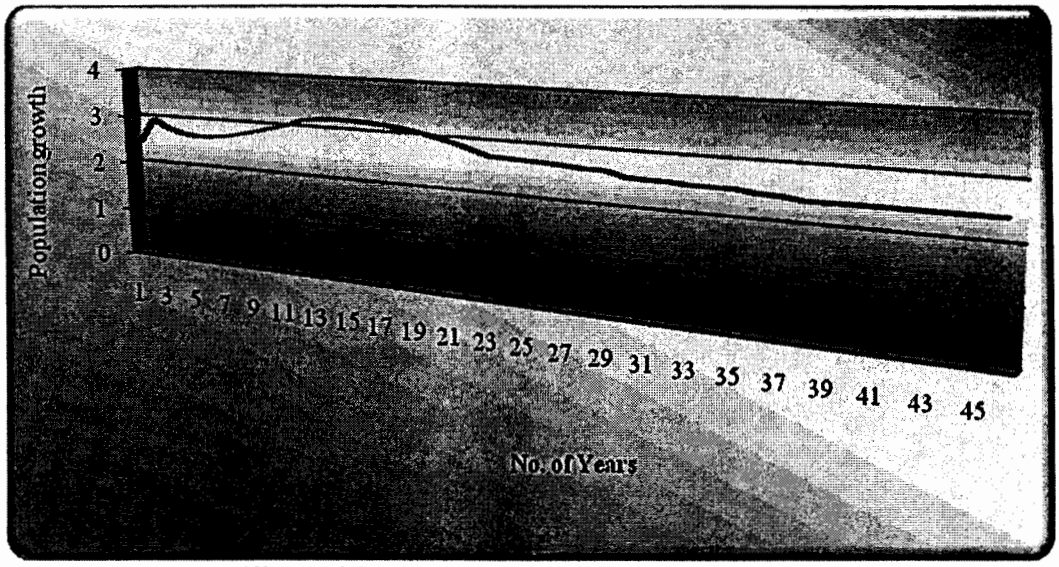

Figure-4.1: Population growth during 1960-2005

(Source: Population census organization, 1998)

Population of Pakistan has increased from 45851000 in 1960 to 155772000 in 2005. Increase in population is considered to as key cause of all the awful circumstances in developing countries.

To convene the demands of growing population, Biocapacity of a region plays a vital role because it is mandatory to sustain human life but the impacts of population growth are very much obvious on declining capacity of biological reserves in Pakistan (Mustafa, 2010). Along with boosting population there has been a long drastic impact on ecological network of this region.

Globally, Pakistan has greater importance in ecological perspective but rapidly growing population tends to exert higher consumption pressure on natural resources hence, turning down bio-capacity and ultimately decreasing Human Development Index.

Biological Capacity in Pakistan has gone through considerable variation during 1960-2005. Figure 4.2 illustrates the same fact.

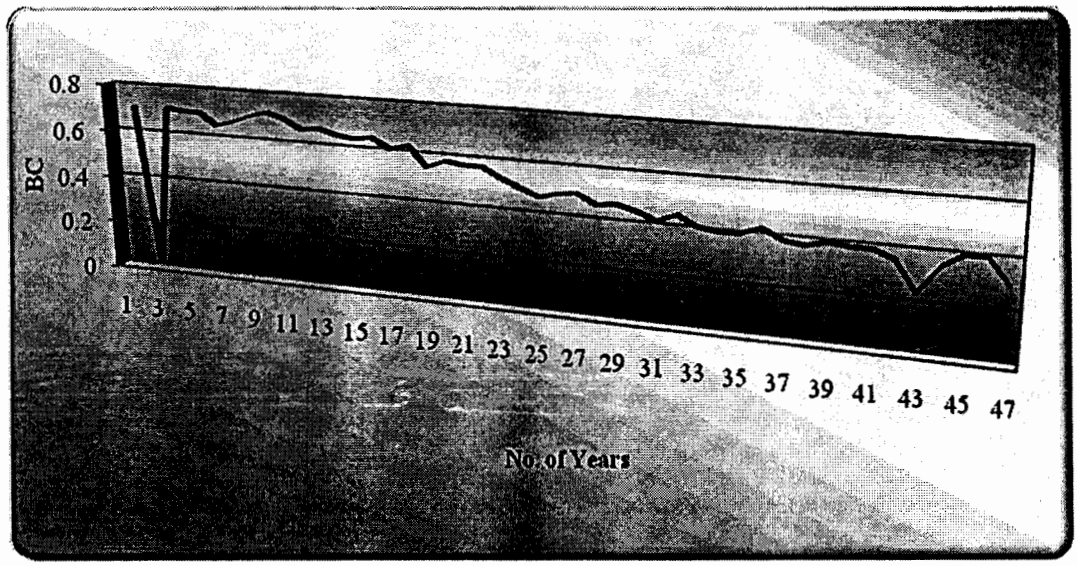

Figure- 4. 2: Evolution of Bio-capacity during years 1961-2006

(Source: Footprint Network Organization)

It is evident from figure 4.2 that rate of population growth has greatly affected the bionetwork of Pakistan during previous few decades. Most significant components of bionetwork in Pakistan include agricultural land areas, forest areas, fisheries, grazing lands and range lands. Along with population growth there are so many other factors that influenced greatly the competency of bionetwork including lack of efficient technology, lack of awareness among people regarding use of bio products, improper management, lack of monetary resources, lack of interest in protection of these bio products etc. amongst all these, population is the key cause of all the issues related to bio capacity of Pakistan.

Increasing Ecological footprint along with emerging population is exhibited in figure 4. 3;

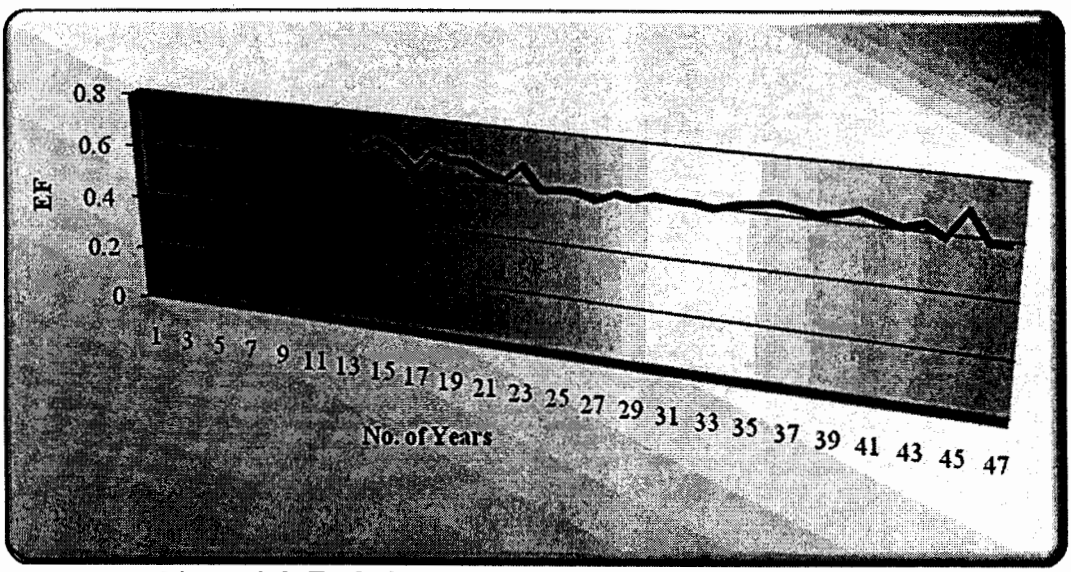

Figure-4. 3: Evolution of Ecological footprint during 1961-2006

(Sources: Footprint Network Organization)

It is evident from figure 4.3 that during previous (almost) half century (1961-2006) pressure on biological products has amplified to conquer the needs of emerging population. As needs of rising population are flourishing day by day but rate of the growth of bionetwork is less than population growth so it is unable to serve the needs of emerging population. As the rate of EF of a region is directly dependent on biological capacity of that region so according to figure 4.3, rate of EF is not showing a great deal of variations during previous few years as compared with the rapid decline of BC in country. If the consumption (pressure) exceeds the bio-capacity, the difference sought after subtraction of these two variables is termed as ecological deficit. Wherever, if the consumption (pressure) is less than the available bio-capacity, the difference sought after subtraction of these two variables is termed as ecological reserve or bio reserve.

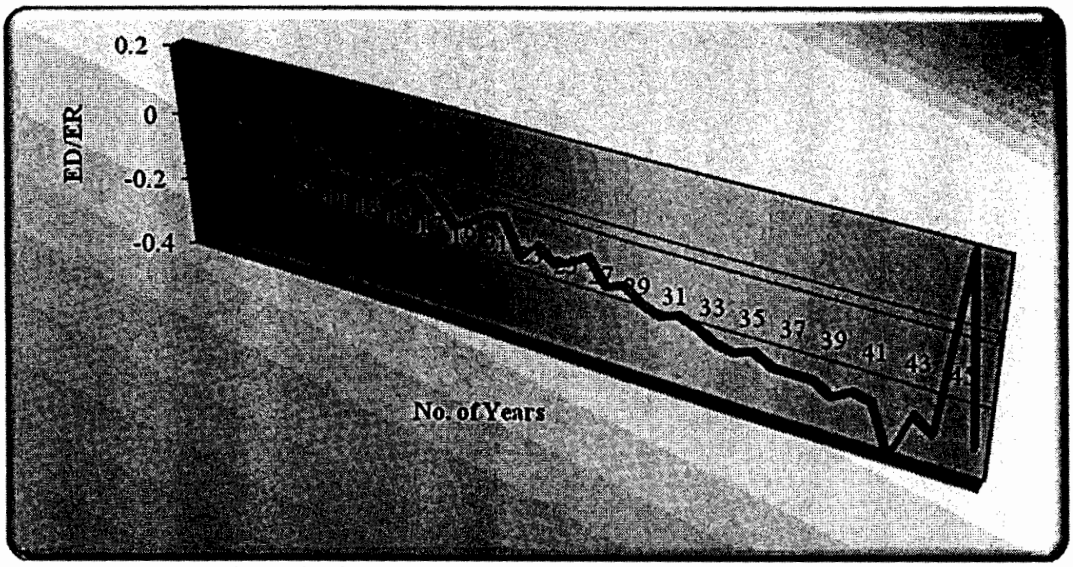

Figure-4. 4: Ecological Deficit/ecological reserve during years 1961-2006

(Source: Footprint Network Organization)

Figure 4.4 gives the apparent picture of impacts of population boom on nature as well as on its components. From this figure, it can be assumed that if the growth rate continues in the same way at a very rapid pace, it will wipe out the components of nature.

HDI is also of great worth with reference to effects of population together with bio-capacity and ecological footprint. Figure 4.5 shows the evolution of human development during last few decades.

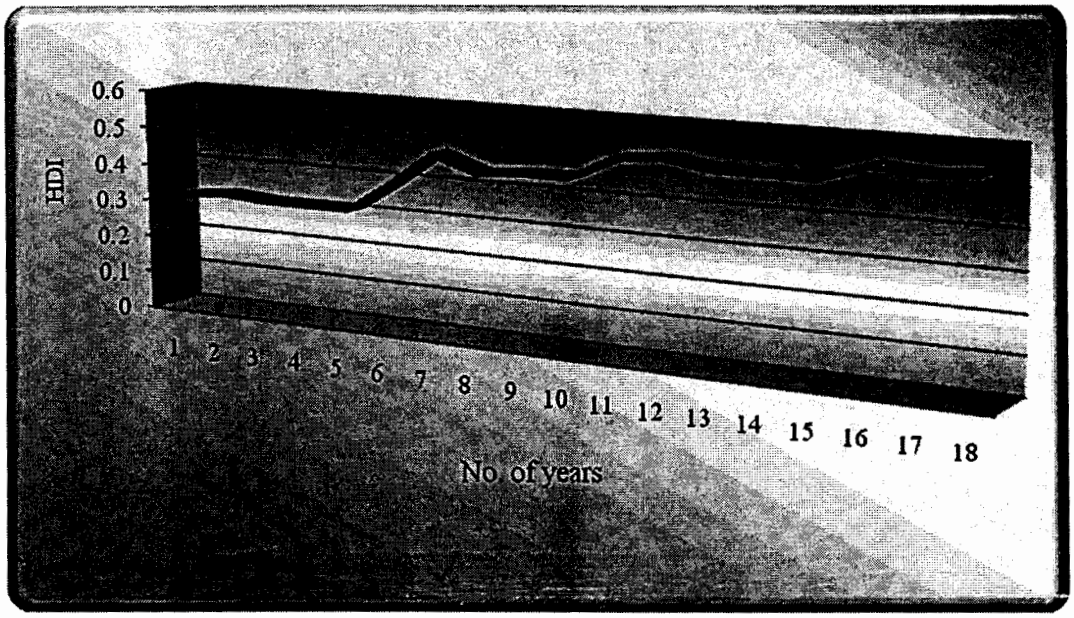

Figure-4.5: Human Development Index of 2 decades

HDI is basically demonstration of three dimensions including, longevity of life; access to the resources and knowledge to use these resources (UNDP, 1990). Figure 4.5 depicts rate of human development during previous few years. It shows that HDI has increased but the rate is not so appealing.

Emerging population along with escalating ecological footprint and declining bio-capacity is causing a rise in poverty. Figure 4.6 represents poverty gap and headcount ratio at dollars 2 and 1-25 a day, respectively.

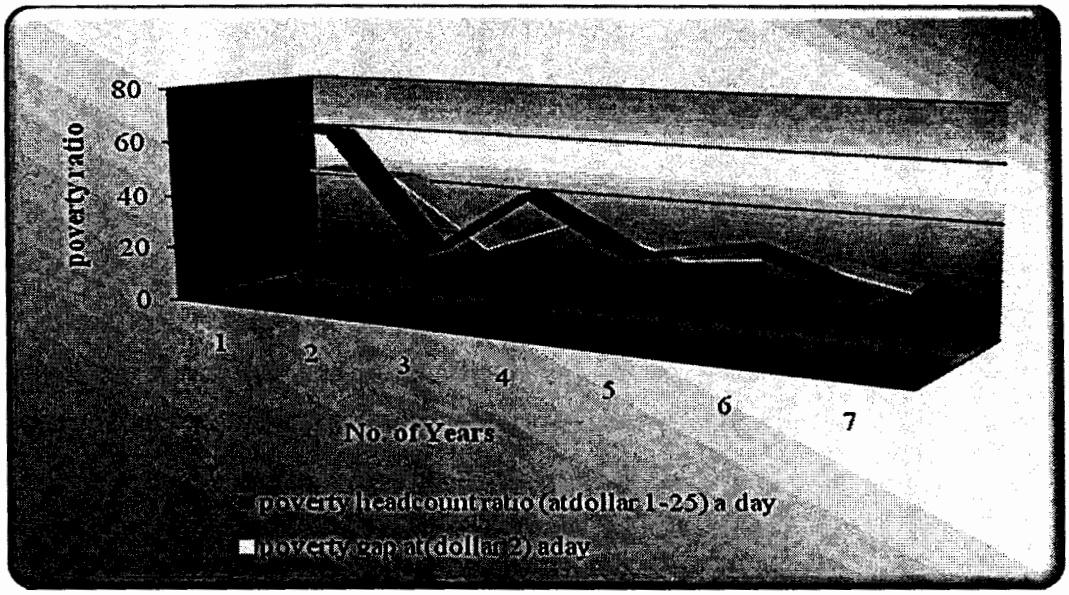

Figure 4.6: Poverty headcount ratio (at dollars 1-25 a day) and Poverty gap (at dollars 2 a day)

Pakistan is a developing nation with reasonable natural capital but with unavailability of efficient technologies to explore them and make them accessible to every individual. Figure 4.6 demonstrates of the Poverty rate of Pakistan. Uneven flow of existing resources is most important ground for poverty in Pakistan. According to an estimate almost near one-quarter of the total population in Pakistan is categorized as deprived (World Bank, 2006) and about 17.2% of total population lives below poverty line (Rahman, 2009).

4.2 Interpretation and Analysis of Data:

For development and ecological parameters was collected from different sources including PCO, FNO and HDR.

Ecological variables included BC, EF and Ed/er. Whereas development variables included HDI and poverty index. Moreover, data regarding population size, and growth was sought from Census department.

4.2.1 Descriptive statistics:

As all the data gathered was numeric thus description of data gathered is given below in the form of table 4.1;

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
population growth (annual%)	46	2.40	3.19	2.7105	.2652
evolution of ecological footprint	46	.59	.75	.6507	3.887E-02
evolution of biocapacity	46	.03	.72	.5096	.1504
ecological deficit/ecological reserve	46	-.40	.20	-.1181	.1210
poverty gap at Dollars 2 day	7	18.74	45.20	30.0014	11.1217
poverty headcount ratio dollars 1-25 a day	7	22.59	66.46	41.5271	18.5333
human development inde	20	.23	.54	.4242	9.855E-02
Valid N (listwise)	6				

Table-4.1: Descriptive statistics for the variables used in research

Table 4.1 depicts the descriptive statistics of different variables used in the current research work i.e. Population growth, Bio-capacity, Ecological footprint, Ecological deficit, Human development Index and poverty. Table 4.1 shows the values for no. of observations used, minimum and maximum values of mean and standard deviation.

4.2.2 Pearson Correlation

Test applied upon variables to develop correlation was Pearson Correlation. Results are shown as follows;

4.2.2.1 Population Growth

Data for Population growth was for during the years 1960-2005. Using SPSS, population growth was correlated with EF, HDI, and Poverty gap & headcount ratio. Correlations studies of all these variables are given as follows;

4.2.2.1.1 Correlation between Population growth and evolution of Ecological footprint:

Population has severely affected every constituent of nature. To meet the needs of increasing population, pressure on natural resources has increased due to increasing ecological footprint. EF is the modern approach use to evaluate the impacts on nature. It is an estimation of impacts of nations upon environment across the globe. As the EF increased it affected biological competency of Pakistan. As Increasing EF is related with growing population so, correlation of EF with population growth is shown in figure 4.7.

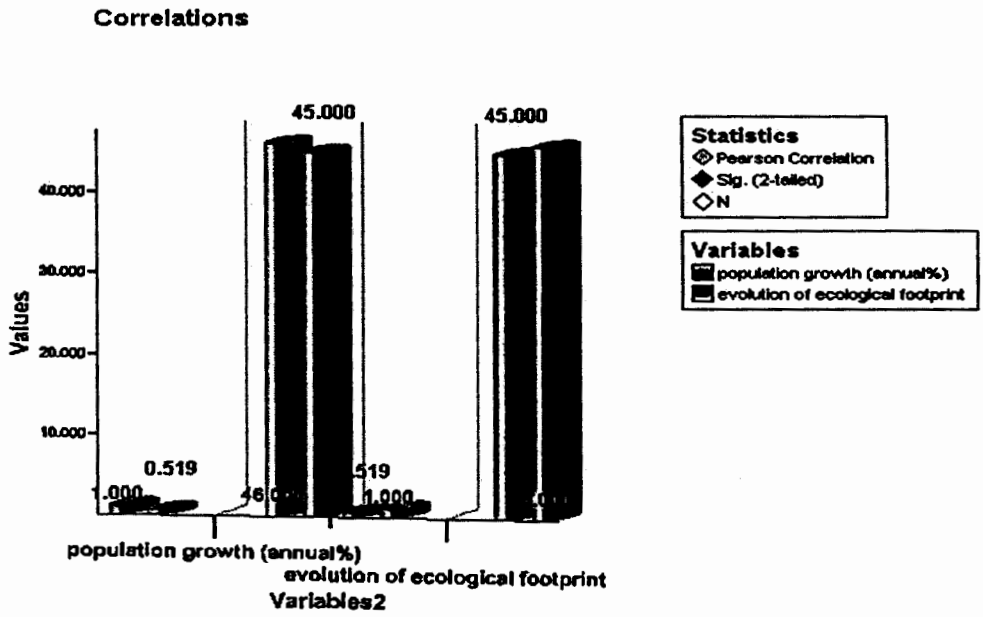

Figure 4.7: Correlation between population growth and evolution of EF

Figure 4.7 shows that correlation value for population growth and evolution of EF is 0.519, it is evident from the figure that population growth and evolution of ecological footprint are moderately correlated with each other. Both variables are positively correlated, so it can be understood from the figure that increase in population results in an increase of EF of Pakistan.

4.2.2.1.2 Correlation between Population growth and evolution of Ecological Deficit:

Rise in population lead to increase in EF of Pakistan results in ecological deprivation. As the EF increased it affected biological competency of Pakistan tends to increase in ecological deficit of Pakistan. ED is in fact an assessment of exploited areas in a region and also helps to evaluate the level of commitment with SD goals.

Correlation of population growth with ecological Deficit/Ecological Reserve is given in the form of figure 4.8.

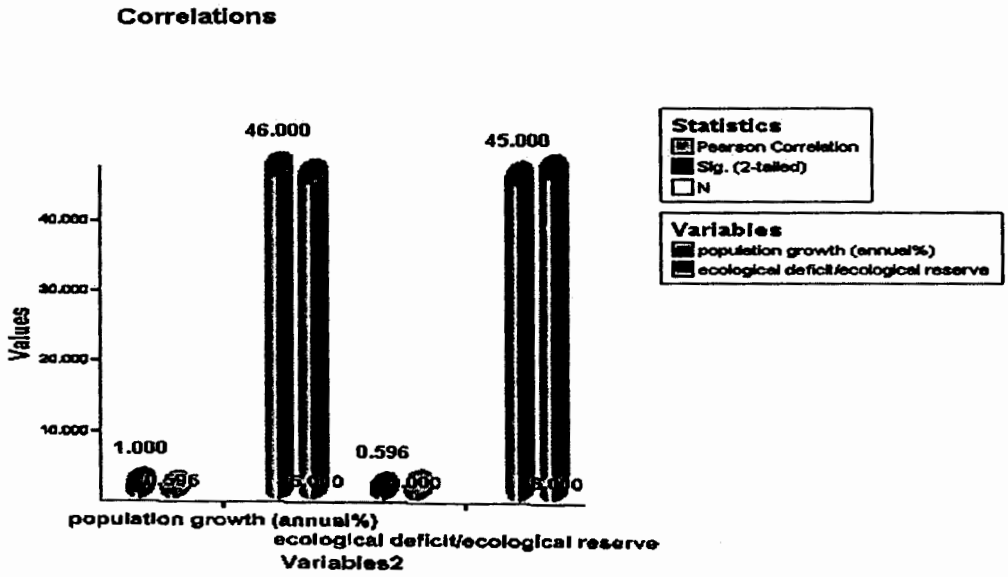

Figure-4.8: Correlation between Population growth and Ecological Deficit/Ecological Reserve

According to figure 4.9, population growth shows the value of moderate correlation with Ecological Deficit of Pakistan. As figure illustrates that value of correlation of population growth and ED/ER is 0.596, so it can be determined that increasing population leads to an increase in ecological deficit, hence, a decrease in ecological reserve.

4.2.2.1.3 Correlation between Population growth and Human Development Index:

Figure 4.9 reveals the correlation of population growth with HDI;

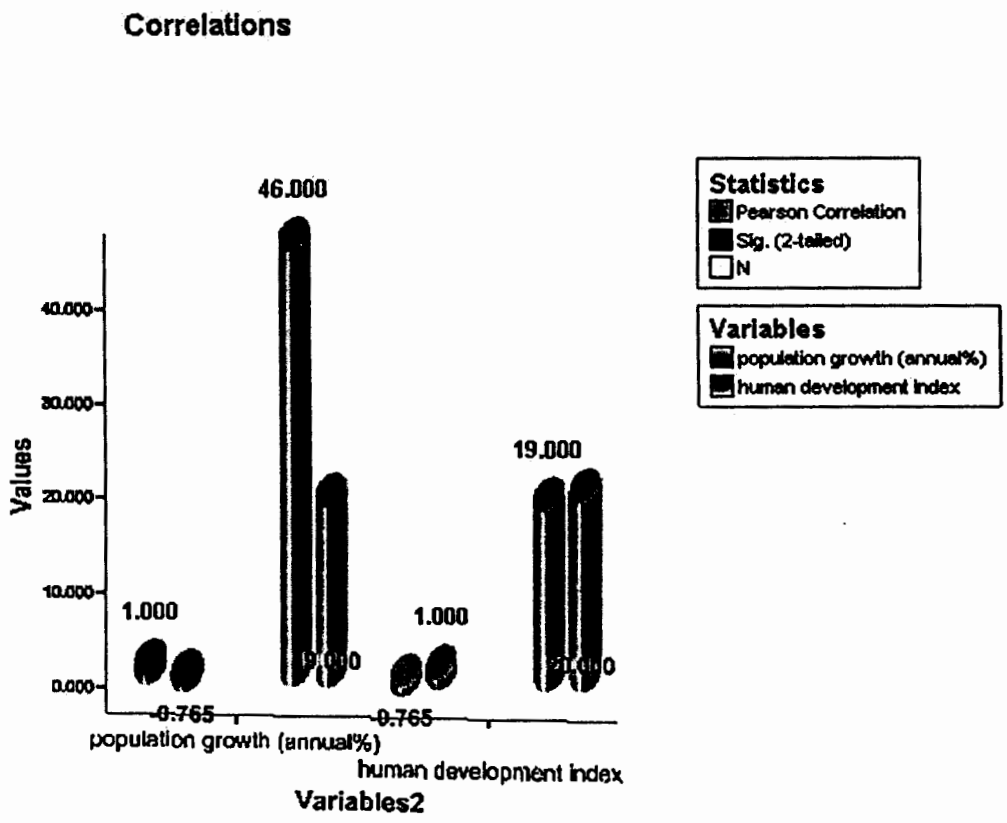

Figure-4.9: Correlation between Population growth and Human Development Index

Figure 4.9 gives a clear idea of correlation between population growth and HDI in Pakistan. Results shown in the figure depict that a negative correlation exists between both variables which means increase in one variable leads to decrease in other variable. According to figure Value of correlation of both the variables is -0.765.

4.2.2.1.4 Correlation between Population growth and Poverty gap (at dollars 2 a day):

Along with boost of population poverty gap has also increased in Pakistan during past few years.

Results for correlation of population growth with poverty gap (at dollars 2 a day) is given as follows in the figure 4.10;

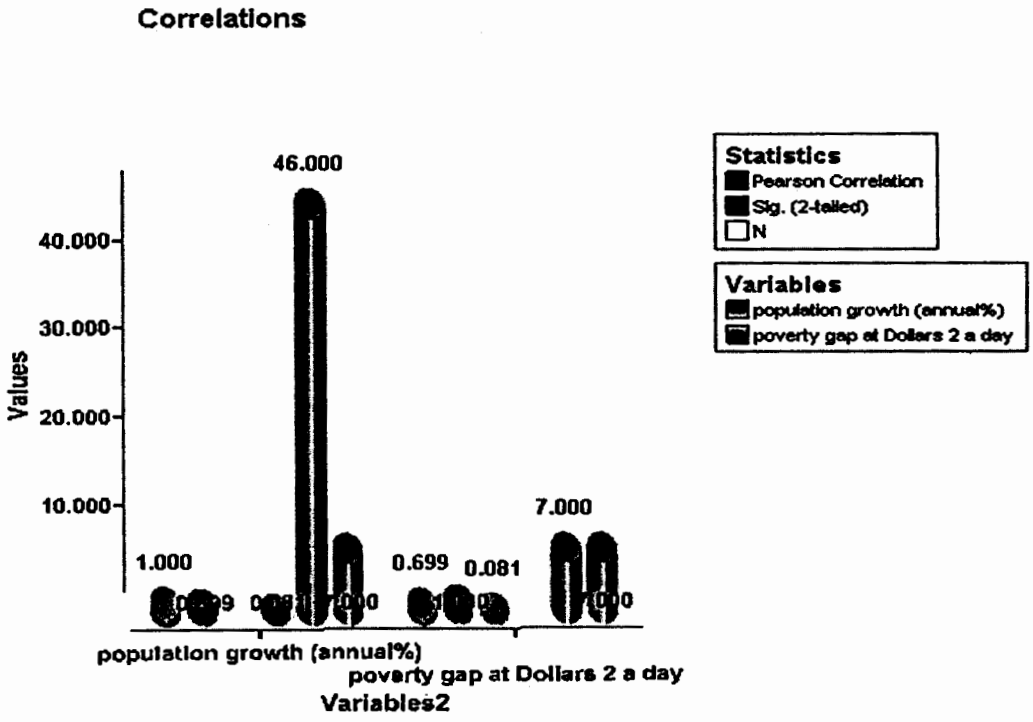

Figure-4.10: Correlation between Population growth and Poverty gap (at dollars 2 a day)

According to figure 4.10, value of correlation for population growth and poverty gap (at dollars 2) a day is 0.699, which shows that there is a moderate positive correlation between both variables.

4.2.2.1.5 Correlation between Population growth and Poverty headcount ratio (at dollars 1-25 a day):

Poverty headcount ratio is associated greatly with population growth and correlation between both variables is given as follows in figure 4.11;

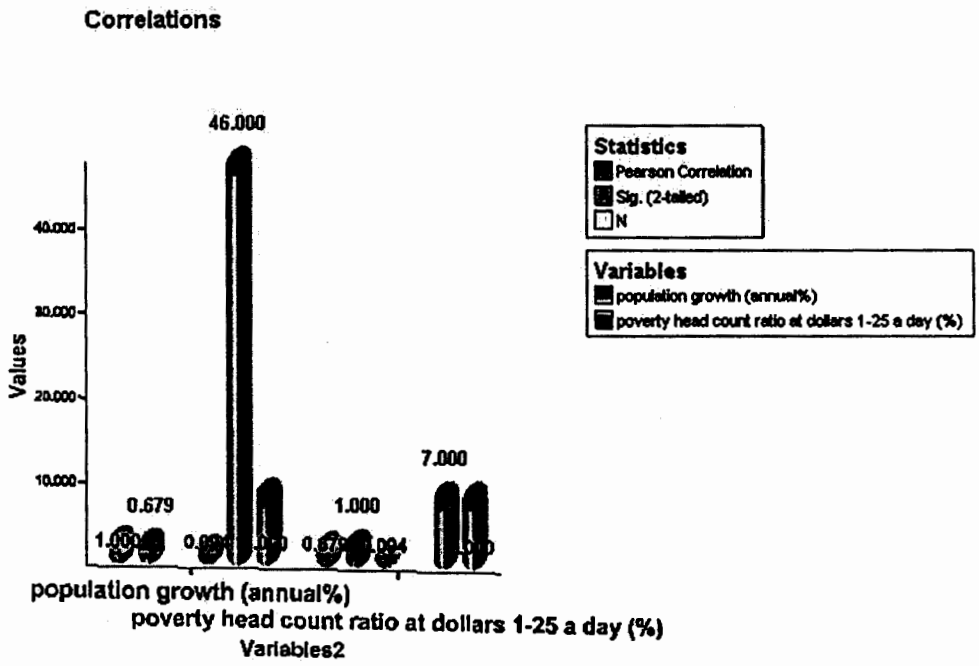

Figure-4.11: Correlation between Population growth and Poverty headcount ratio (at dollars 1-25 a day)

Figure 4.11 describers that there is a moderate positive correlation between poverty headcount ratio and population growth. Value of correlation obtained for both variables was 0.679.

4.2.2.2 Evolution of Ecological Footprint

Data regarding evolution of EF was for the years 1961-2006. Data analysis has been done same as like for the population growth. Evolution of EF was correlated with HDI and Poverty.

4.2.2.2.1 Correlation between evolution of EF and HDI:

As along with ecosystem and bionetwork, HDI of Pakistan has also severely influenced by escalating EF of the country. Both HDI and evolution of EF are

consistently interrelated with each other. As to attain the growing needs of rising population and to achieve the goals of human development all the burden is exerted on ecosystem such as; to fulfill the residential needs of escalating population, plain areas are required to build houses, and for this purpose forest areas are converted into residential areas. Now a day, foremost focus is to erect concrete forests instead of green forests.

Correlation of both variables is given in figure 4.12;

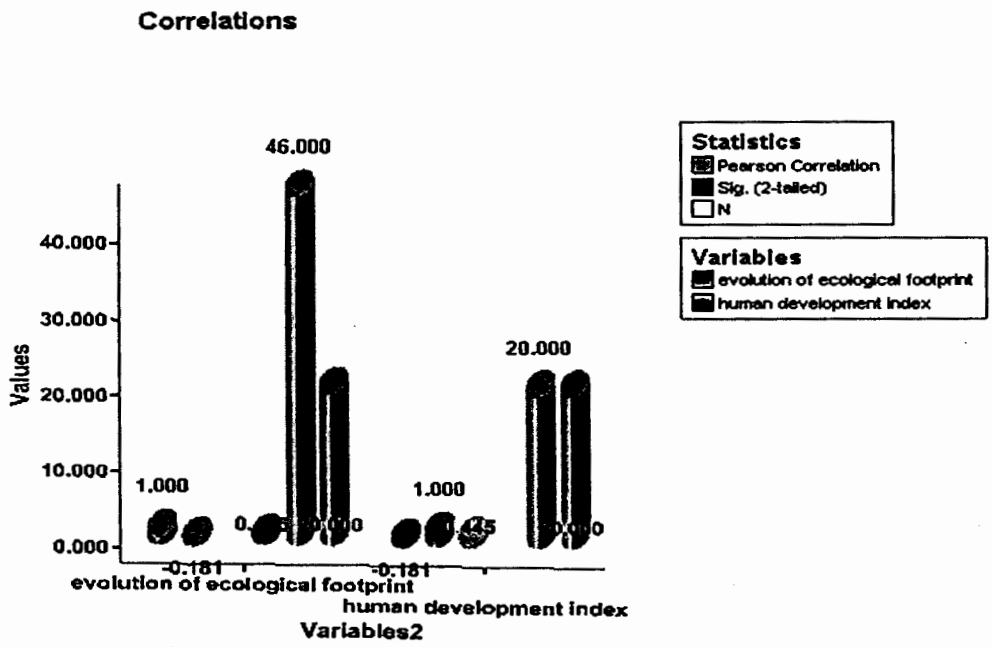

Figure-4.12: Correlation between evolution of Ecological footprint and Human Development Index

Figure 4.12 depicts that evolution of EF and HDI both are negatively correlated with one another their value of correlation is -0.181.

4.2.2.2.2 Correlation between evolution of EF and Poverty gap (at dollars 2 a day):

Figure 4.13 shows the correlation among both variables;

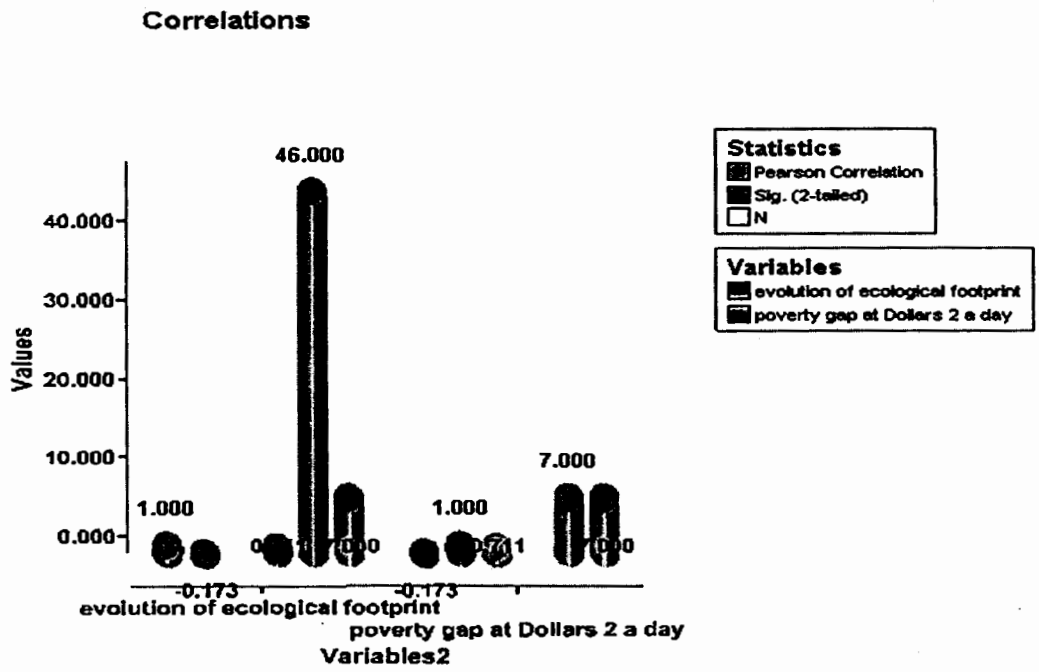

Figure-4.13: Correlation of evolution of Ecological Footprint with Poverty gap (at dollars 2 a day)

According to figure 4.13 evolution of EF is negatively correlated with poverty gap (at dollars 2 a day) with the value of correlation -0.173. It seems to be a illogical from one point of view that increase in EF should lead to depletion of resources and hence exacerbation of poverty due to poor quality of resources. But we can plead in favor of this negative correlation by saying that higher class contribution more to increase in EF and poor becomes poorer due to unequal distribution of both, economic and natural resources.

4.2.2.2.3 Correlation between evolution of EF and Poverty headcount ratio at dollars (at 1-25 a day):

Figure 4.14 demonstrates correlation between EF and poverty headcount ratio;

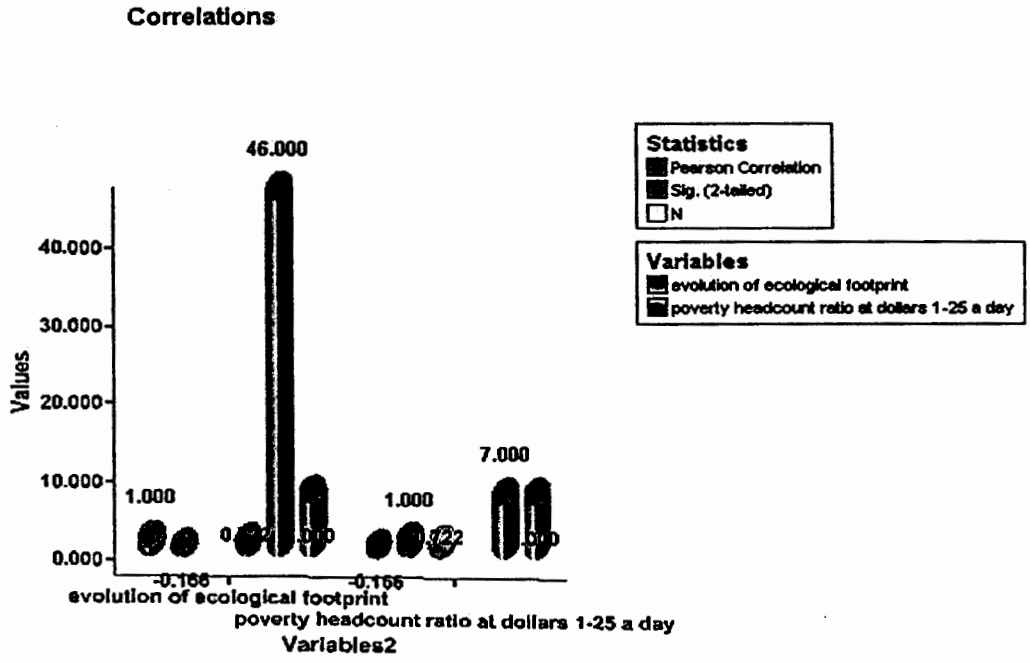

Figure-4.14: Correlation between evolution of EF and Poverty headcount ratio (at dollars 1-25 a day)

Figure 4.14 shows that both variables are negatively correlated with each other. Value of correlation is -0.166.

4.2.2.3 Evolution of Biological Capacity

Data regarding BC was available for years 1961-2006. Using SPSS; a statistical software; evolution of BC has been correlated with HDI and Poverty. Results for developing correlation among variables are shown below;

4.2.2.3.1 Correlation between evolution of BC and HDI:

Population demands increased during previous few decades in Pakistan and drop off of bio-capacity is presently due to increasing HDI to accomplish the growing needs of escalating population of country. Increasing HDI during previous two decades has influenced greatly the evolution of BC for increasing demands by mounting population.

Correlation of evolution of BC with HDI given as follows in figure 4.15;

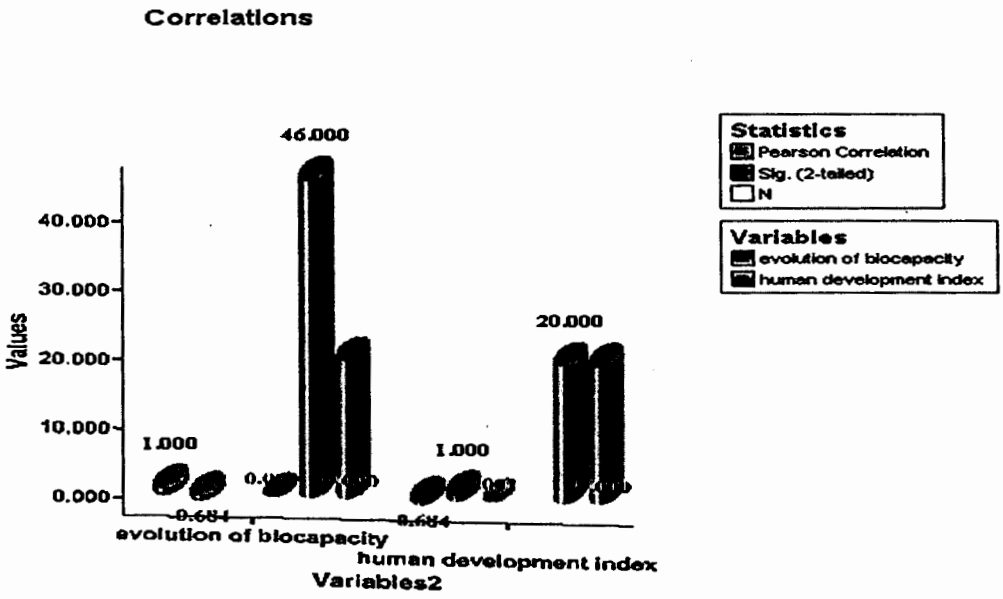

Figure-4.15: Correlation between evolution of Biological Capacity and Human Development Index

Figure 4.15 illustrates that, both the variables i.e. evolution of BC and HDI are negatively correlated with one another. Value of their correlation obtained is -0.684.

4.2.2.3.2 Correlation between evolution of BC and poverty gap (at dollars 2 a day):

Increasing competition among individuals for resources results in declining BC. As a result of decline in BC of country poverty has increased.

Figure 4.16 demonstrates the correlation of both variables;

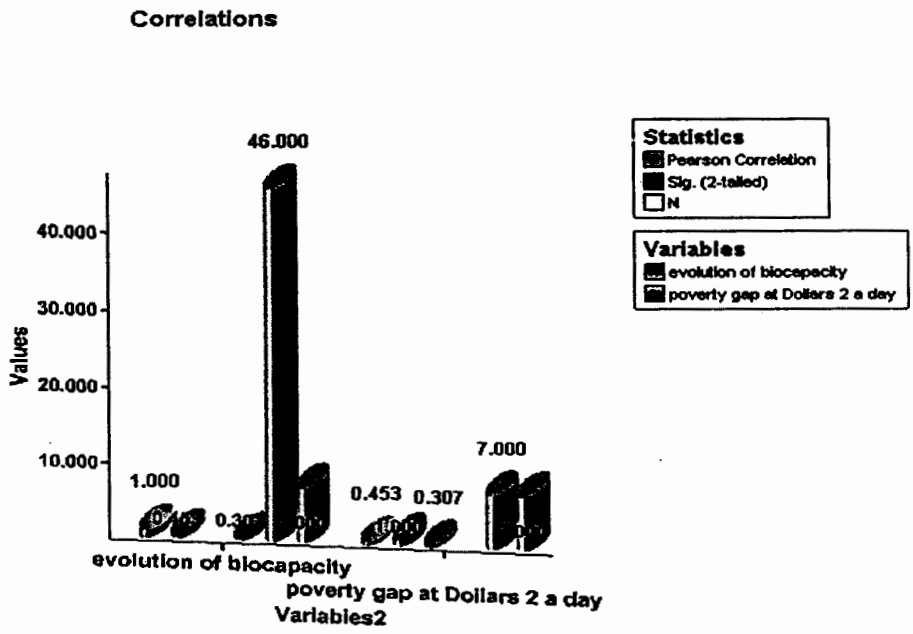

Figure-4.16: Correlation between evolution of Biological Capacity with poverty gap (at dollars 2 a day)

According to figure 4.16, value of correlation attained for evolution of BC and poverty gap (at dollars 2 a day) is 0.453. Both of these variables are positively correlated but correlation is not so strong, as a result decrease in BC has not shown stronger effects upon poverty gap. Though logically, a decline in poverty gap should lead to an increase in poverty gap.

4.2.2.3.3 Correlation between evolution of BC with poverty headcount ratio (at dollars 1-25 a day):

Figure 4.17 shows the results obtained through applying test of Pearson correlation on both variables;

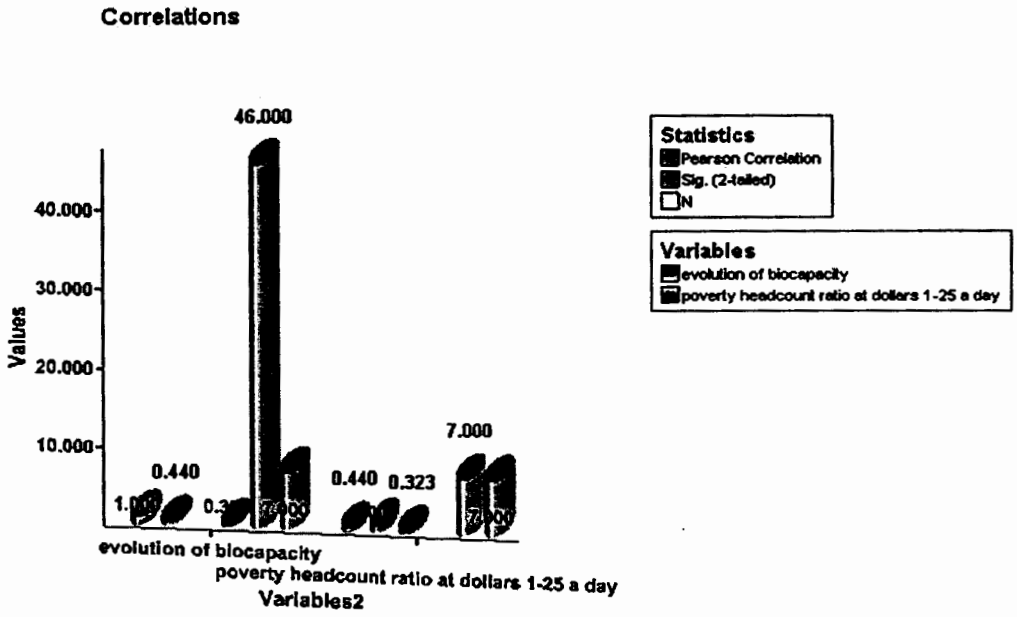

Figure-4.17: Correlation between evolution of Biological capacity and Poverty headcount ratio (at dollars 1-25 a day)

According to figure 4.17, value of correlation is 0.440 which demonstrates that positive correlation among both variables is there but weak.

4.2.2.4 Ecological Deficit/Ecological Reserve

Data for ED/ER was available for years 1961-2006. In this section correlation between ED/ER, HDI and Poverty will be observed.

4.2.2.4.1 Correlation between Ecological Deficit and HDI:

Growing needs of emerging population led to increasing ecological deficit in the country during past years. The foremost cause for this ground was fulfillment of residential needs of people in the urban area of country during previous few decades. For this purpose biological reserves including forests, agricultural land areas, hilly areas etc. have been shrunken to expand cities.

ED/ER and HDI are correlated with each other. Results obtained through Pearson correlation are given in figure 4.18.

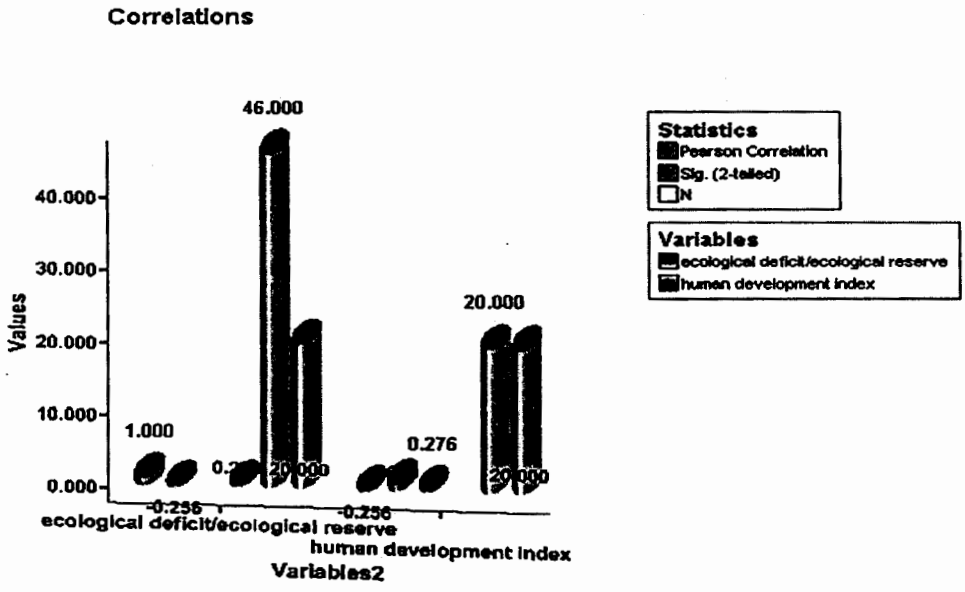

Figure-4.18: Correlation between Ecological Deficit/Ecological Reserve and Human Development Index

According to figure 4.19, correlation value for ED/ER and HDI obtained through analysis is -0.256 which determines that negative correlation existing between both these variables is same. An increase in Ecological Deficit will lead to a decrease in HDI and vice versa.

4.2.2.4.2 Correlation between Ecological Deficit and Poverty gap (at dollars 2 a day):

Poverty along with other variables is also associated with rising ED/ER in Pakistan. Increasing competition for resources among individuals along with growing population, made consumable goods of bionetwork out of reach by those who are economically unstable. Another reason for poverty in Pakistan is unequal distribution of resources, those who are dominant have easy access to these resources but those who are incapable they are powerless to access them.

Correlation of ED/ER with poverty gap (at dollars 2 a day) is given in figure 4.19;

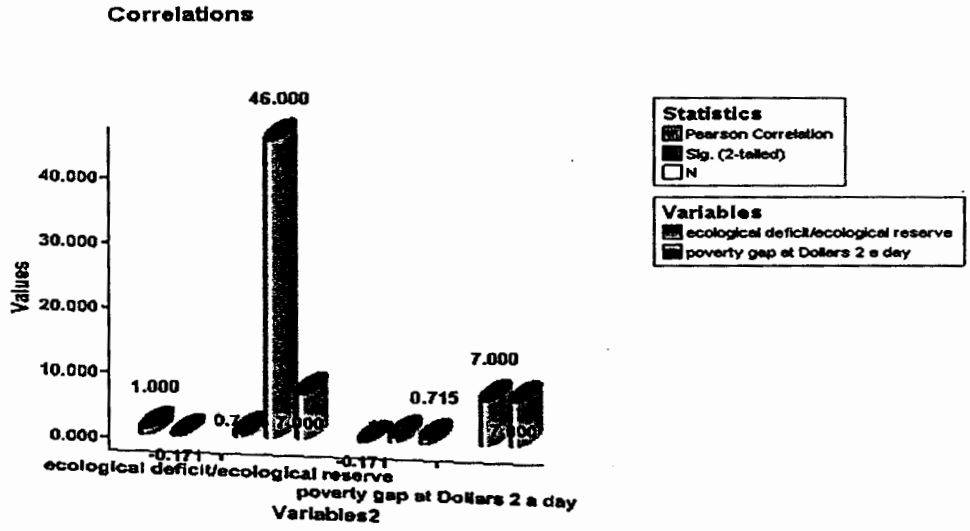

Figure-4.19: Correlation between Ecological Deficit and Poverty gap (at dollars 2 a day)

According to figure 4.19 value of correlation obtained through analysis for both variables is -0.171, it determines that negative correlation among both variables is weak. Logically, Ecological Deficit and poverty gap have a directly proportional relationship.

4.2.2.4.3 Correlation between Ecological Deficit and Poverty headcount ratio (at dollars 1-25 a day):

Correlation between both variables is depicted in figure 4.20.

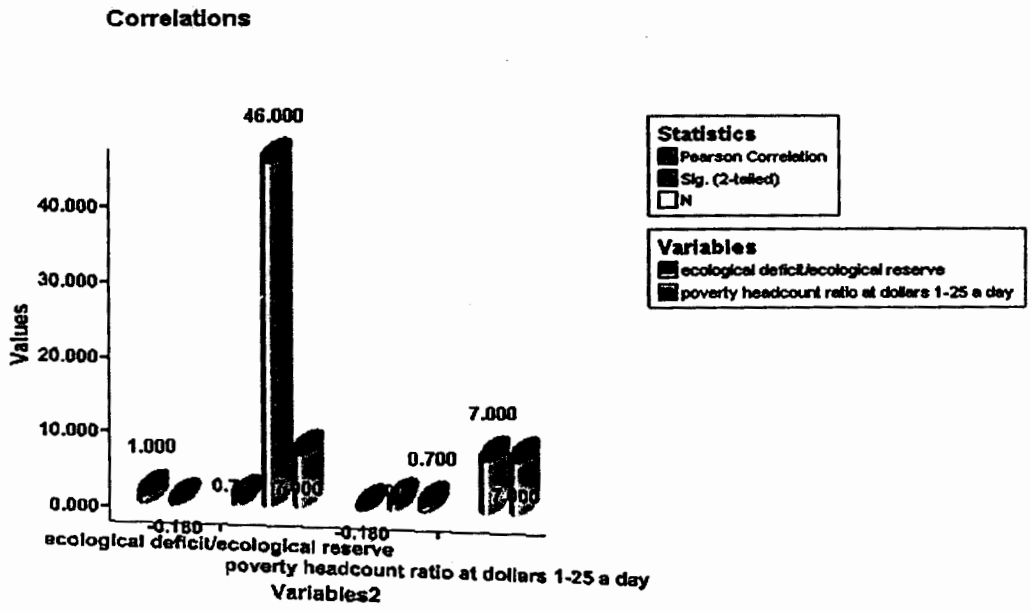

Figure-4.20: Correlation between ED/ER and Poverty headcount ratio (at dollars 1-25 a day)

Figure 4.20 depicts that value of correlation obtained for both variables through data analysis is -0.181. Negative correlation is not so strong. As demonstrated earlier that efficient use of resources through appropriate technology let ecological system of Pakistan to be safe for future generation and led ED/ER to reduce, but poverty is seems to be towering with the emerging population owing to political instability and economic imbalance in Pakistan since it into existence.

Chapter-5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions:

The current study shows that increasing EF due to escalating population led BC to decline due to more consumption pressure. Heavy population growth during previous few decades has shown its impacts upon various sectors including agriculture, forest, grazing land areas, fisheries, rangelands. Growing demands of emerging population mainly include; food and residence and to meet these demands all the above mentioned sectors affected rigorously during about past half century.

Agricultural sector is considered as back bone of Pakistan but in recent times this sector is rigorously pretentious for the sake of fulfillment of the demands of expanding population. People are moving towards cities due to unavailability of basic facilities in villages resulting in expansion of cities. To achieve the residential requirements of people, cities are expanding and captivating over villages by merging with them. Forest areas have changed into barer lands to accomplish the residential demands.

Findings of this study revealed that all the contemporary issues in Pakistan are based on growing Population. Growing population let BC to reduce due to increasing competition among individuals, resulting in ecological deficit and rise in poverty.

There is a famous quotation by Chuck Palahniuk depicting the current scenario awfully;

"Either a species learns to control its own population, or something like disease, famine, war, will take care of the issue." **(Chuck Palahniuk; 1961)**

5.2 Recommendations:

- As population is the key origin of all the issues in Pakistan so, at government level, there is a need to take significant steps to control population. There are various methods existing for population control. Government should make people conscious regarding worse impacts of population upon their survival in future, by launching campaigns at community level by using media.
- One of the foremost causes of all issues in Pakistan is lack of policies. There should be strict policies and regulations introduced by government along with their implementation strategies to stop the unequal circulation of resources among people. This would help to reduce the current pressure built on bionetwork due to uneven flow of resources.
- It is needed to take steps for the intensification of biological competency in harmony with consumption of biological products. For this intention, possibly launch outstanding projects for rehabilitation of environment and components of environment should be launched.

- There is a need to integrate the concept of development along with sustainability to convert it into Sustainable Development because it is an essential tool to conserve bio capacity, and people should be encouraged through awareness to arrive at it.

- To boost up food production for fulfillment of growing demands, it is needed to put efforts by introducing efficient technologies among farmers along with appropriate understanding of their employees, this can be done by organizing short trainings. This would help to reduce wastage of a large quantity of agricultural products produced.

- People should be aware of their role in society; they can participate by looking upon issues. NGO's with the proper support of government can be engaged in this activity.

- It is mandatory to provide amenities like educational institutions, hospitals with proper equipments and staff, water and sanitation, electricity and gas in villages to hearten people reside and work in villages.

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