CONCLUSION

The physical expressions and pattern of sprawl of Aligarh city have a general opinion which appears to be divided over the social, economic and environmental impacts of urban encroachment. However, the work is not fully in conjecture with adverse impacts of urban encroachment, but there are also affirmative percussions seen in the form of rural development and rural transformation. With reference to environment, the situation seems to be much problematic and directly related to degradation and losses. The socio-economic impacts of urban encroachment are seen in the form of disparities in demographic and spatial characteristics of the urban fringe.

During the period of 1901-2001, the population of Aligarh city has increased from 72,084 persons to 6,69,087 persons, showing a growth of 828.8 per cent and in absolute terms as 5,97,003 persons. If we include the estimates of Provisional Census of 2011, the population amounts to 8,72,575 persons registering a growth of 1110.8 per cent during the period of 1901-2011. As per the estimates, the area of city during 1901-1951 was 11.05 sq. km. and by 2001 it increased to 44.86 sq. km. showing a growth of 305.6 per cent. Currently during 2011, the area was 56.72 sq. km. registering a growth of 412.8 per cent, during the same period of 1901-2011. Therefore, the city of Aligarh shows a phenomenal growth in terms of population and area. The Aligarh Master Plan Report of 2001-21 has extrapolated the area of city as 113.8 sq. km. and, the population of as 12,49,352 persons by the year 2021. Thus, the Aligarh Urban Agglomeration will chop-out a large amount of rural agricultural land approximately equal to that of the present built-up area of the city. Foreseeable impact of this process includes the encroachment on fertile agricultural lands, increased stress on the natural environment, with ominous implications for the economic base, socio-economic and demographic characteristics, and the health and well-being of communities residing in urban-fringe areas.
Streaming growth and hasty expansion of Aligarh city acts as a powerful magnet for economic opportunities and has a potential to unlock the multiplication of economic activities in the city. Most important growth factor in Aligarh city is its function of education, marked with the presence of a huge campus of the Aligarh Muslim University. Industrial production and commercial trading are also responsible for economic growth in the city. Progress in manufacturing and service activities, ranging from agriculture to construction and hospitality to communication, provide a good platform for producers and consumers. The other growth factors include the development of highways, nearness to National Capital Region of Delhi in the north, the opening of Yamuna Expressway in the west, proposed construction plan of the Ganga Expressway in the east, an airport in the south, and development of industrial estates and building of residential colonies along highways.

Economic growth is directly related to per capita income and sectorwise growth in Gross District Domestic Product (GDDP) and Net District Domestic Product (NDDP) of Aligarh. It clearly reveals that, there is advancement in all sectors of economy in the city. Similarly, expenditure on facilities rendered by the Municipal Corporation has also increased from Rs. 5.0 million in 1971 to Rs. 180.2 million in 2001. Most part of the municipal budget is allocated to be spending on general administration, public health and conveniences, while the expenditures on public safety, public works and public institutions are kept on second preference. The municipal income has also increased from Rs. 4.89 million to Rs. 237.6 million in 2001.

As a consequence of urban development, the encroachment of agricultural lands was examined on the basis of different parameters viz., city morphology, rural-urban migration, development of residential houses, transportation facilities, industrial development, commercial and market development, government offices, and community services such as education, health, sanitation and other services.
Among the above parameters, migration is considered to be a most significant parameter of urbanization. Main causes acting as pull factors have shown a rapid increase in the rate of migration of population in the city and its periphery are: development of industries, education facilities, markets, health and infrastructure. This is also proved from the statements given in the Census Hand Books: Village and Town Directory for the years 1971, 1981, 1991 and 2001 about the civic and other amenities, and on trade and commercial activities during the years.

Urban expansion in Aligarh is considered to be a major cause of permanent loss and abandonment of agricultural lands in the fringe areas. Absolute loss of agricultural land during the last 30 years (1971-2001) is seen concentrated into nine pockets along the highways. These pockets of loss of agricultural lands are seen between the roads of:

1) Ramghat Road and Kanpur Road.
2) Kanpur Road and Agra Road.
3) Agra Road and Mathura Road.
4) Mathura Road and Gonda Road.
5) Gonda Road and Khair Road.
6) Khair Road and Delhi Road.
7) Delhi Road and Baroli Road.
8) Baroli Road and Anupshahar Road.
9) Anupshahar Road and Ramghat Road.

According to the Master Plan Report, 2001-21, in Aligarh city 2200 ha. of land was proposed to be developed for housing purposes, out of which, 724 ha. of land will be for the main built-up area, while the remaining of 1476 ha. lies in between 9 pockets. Because of socio-economic and political development in town and as its status of prime geopolitical city, the period in between 1971 and 2006 was marked with dramatic changes in the city landscape. About 35 residential colonies in the
urban fringe of Aligarh have been marked out as illegal, and out of which 29 have
developed on previously pure agricultural lands, 3 colonies on parks and open spaces,
2 over the lands of central activities, and 1 on industrial land.

A change in cropping pattern is also occurring due to urban expansion of
Aligarh city on rural landscape that, the farmers now prefer to grow cash crops rather
than the traditional crops. Industrial and new market oriented crops, like sugarcane,
potato, vegetables (for supply to large markets), fodder for dairies, maize for poultry
etc. are the preferable choices of the farmers. As a result, a decline has occurred in the
availability of local food grains and suppliers are looking for imports of essential
commodities from outside areas.

The research work further concludes with the problems of environmental
degradation and ecological changes taking place in urban fringe. Issues related to land
degradation and resource utilization are: strip mining, brick kilning activities and
degradation of ground water resources. The critical impact of these activities are seen
in the form of water logging, soil erosion, damage to crop fields, air pollution, decline
in water table etc. The occurrence of these activities is very much detrimental to
environment if left mismanaged. Many villages of fringe areas face these problems
because of carelessness of administration.

Another issue related with environmental degradation is the destruction of
wetland ecosystems and loss of biodiversity. The process of urbanization definitely
has an impact on wetlands that lie in urban territory and in urban fringes. Wetlands
have a number of functions, e.g., climate regulation, water regulation, waste
treatment, habitat, food production, recreation, and education, but they have been
dramatically destroyed with the development of human society. During the survey it
was found that, out of a total of 42 wetlands, 22 have dried up, 10 have disappeared
from the scene as a result of encroachment and the remaining are under the clutches
of human pressure. Encroachment on wetlands by residential colonies is clearly
indicated through the satellite imageries. Various root causes and their varying intensities conclude that, most of the root causes of wetlands’ loss have a common approach i.e. unplanned human development, which is a problem of each zone of city fringe and promoting unsustainable resource consumption at the cost of environmental degradation.

There is also a corporation of problem of environmental pollution in Aligarh city. Conclusion is arrived that, due to increase in combustion of fuel in automobiles and industries, and the addition of metallic dust and toxic gases in the atmosphere have caused air pollution in the city. Industrial and domestic waste water has contaminated the ground and surface water resources which has created health hazards to the people living in fringe areas. Also the dumping of urban wastes in agricultural fields located in fringe areas have led health problems, and causes pollution to soil and water. Dumping of coal ash generated by a thermal power station located in the outer fringe area is also an impactful activity in rural areas. This coal ash is harmful when moves with the winds and is hazardous to health of the people and to cultivated fields in the surrounding areas.

Climate change and formation of urban heat island is also directly related with the growing urban activities, particularly which involve the use of fuels. A city can be distinguished from its surrounding rural areas on the ground of its climatic conditions. This is the key concept of the formation of ‘urban heat islands’. On this issue, no substantial work has been done so far in the study area, but it can well be taken in future to ascertain the climatic impact of urbanization on physical environment of the city.

Analysis of the impact of urban encroachment on socio-economic frame of the urban fringe is presented in last chapter of the thesis. Socio-economic profile of three development blocks namely, Jawan, Lodha and Dhanipur forming urban fringe of Aligarh is presented. At the first instance it has been mentioned that, the highest
density of population is seen in Lodha block with 923 persons per sq. km, the Jawan block recorded a density of 912 persons per sq. km, and the Dhanipur shows the lowest density 750 persons per sq. km. The highest literacy rate of 60.4 per cent is seen in Lodha, Jawan 59.6 per cent and Dhanipur 56.4 per cent. Dhanipur block has experienced least urban impact on rural landscape, where the share of agricultural work force is 59.1 per cent, the Lodha block shows a least share of 44.4 per cent. Secondly, from the figures of land use characteristics it can be concluded that, lands of three blocks are characterized with intensive agricultural system and farming forms the mainstay of livelihood. Thirdly, the impact of new agricultural technology on farming is also another indicator of economic development in the study area.

With the analysis of demographic characteristics of 40 villages selected for the survey it emerges that, as one moves away from the city, the density of population tends to decrease. The density of population declines from Inner fringe of city towards the Outer fringe because of decreasing urban impact on fringe areas. Also the sex composition i.e. the number of females per thousand males shows an increasing pattern from Inner fringe towards the Outer fringe because of out-migration of male population for employment opportunities.

In the Inner fringe, the share of land in non-agricultural use is highest to the extent of 24.7 per cent, in Middle fringe, it is 15.7 per cent, and in Outer fringe is least to the tune of 14.3 per cent. The share of land under agricultural use shows an increasing order from Inner fringe to Outer fringe in order of 75.3 per cent, 84.3 per cent and 85.7 per cent, respectively. Hence, it is concluded that, agricultural activities increase from inner margin towards the outer margins of the fringe areas and a reverse order is seen in non-agricultural activities. Development of agriculture achieved is seen through the adoption of improved seeds, fertilizers, machinery, insecticides, pesticides and new means of irrigation. It is also clear from the study, the application of new agricultural technology in fringe areas of the city is inapt and feeble because
many native farmers of villages which are located in remote areas are unable to avail these facilities.

A gradual expansion of city as an industrial centre and with changing economic base puts a clear impact on rural landscape of urban fringe. Evidences can be sited from the blocks of Jawan, Lodha and Dhanipur that, large chunks of good agricultural lands have been encroached upon and brought in use for non-agricultural purposes. This situation can clearly be sited taking examples from the villages of Jawan block such as, Ramgarh Panjupur, Manzargarhi and Maheshpur. A similar condition can clearly be sited from the villages of Lodha block namely, Alapur Garhia, Rorawar, Alahadadpur, Shahpur Qutub and Mukundpur. In Dhanipur block, these transformations are seen in villages of Kwarasi, Asadpur Kayam, Bhadesi Mafi and Sukhrawali where most farmlands have been converted for residential and institutional purposes.

Planning and governance of fringe areas of Aligarh city can be attempted through a diagnostic approach. The study has suggested creating a separate governing body as ‘Urban Fringe Development Authority’ (UFDA) for all cities facing the problems similar to that of Aligarh. Adoption of sectorwise zonation of city and its metropolitan area is the present need and for future planning.

In the fringe areas of Aligarh city, there is a wide range of agricultural practices, which permit the production of a wide range of agro-products, thus catalyzing a fast growth of agro-based processing activities. The conversion of raw agricultural produce into edible and or marketable products takes place often in urban-rural fringe areas which has equal access to the raw material, labour and the markets. The study began with the question: Can Agro-Processing Clusters (APCs) located in urban-rural fringe areas unleashes the synergy among the environmental, agricultural and economic development. The internal working and external environment of clusters and availability of all necessary assets in the fringe areas of
Aligarh city suggests an answer in affirmation. Therefore, Development of Agro-Processing Clusters (APCs) will be helpful in empowering the rural masses by encouraging agri-entrepreneurships at village level, preserving the local agriculture, and providing sustainable livelihood through local resource utilization.

SUGGESTIONS AND MEASURES

The movement of people from rural to urban areas results in the growth of urban centers not always seems to be impactful. Although urbanization has numerous impacts on physical environment, it also shares with advantages as well. These advantages are seen in the form of socio-economic benefits, for example, increase in food production, rise in fertility rates, increase in working efficiency, conveniences, access to resources, employment opportunities, socio-cultural amenities, education, health etc. As a result of urbanization, cities usually extend into the surrounding urban fringe areas where agricultural activities are replaced by non-agricultural activities. Land shift out from agriculture to non-agriculture because its use becomes economically more productive. As a consequence of uncontrolled spread of development the growth of cities assumes as urban sprawl, which is always associated with unplanned and haphazard growth.

In the urban fringe of Aligarh city socio-economic growth is a continuous phenomena, therefore, there is a need to maintain equilibrium in planning for achieving a sustainable development. To overcome the risks of associated rapid urbanization, there is need of rational policies of the government which should be adaptive, participatory, and effective. Ironically, globalization itself is changing the roles and responsibilities of concerned governments at all levels through the decentralization policies (Charles, et al., 2004). This decentralization of responsibilities at municipal level is an opportunity to be designed and implemented locally with relevant policies (World Bank, 2000). Therefore, sustainable cities are
cities where social and economic interests are in harmony with environmental interests, thereby ensuring sustainability in change (Cigale, et al., 2006).

Cities of developing countries exhibit a wide range of patterns and priority issues which can be considered as follows:

- A majority of the world’s population lives with poverty.
- Social and economic differentiations within and between cities are growing.
- There is inadequacy in clean water availability, sanitation facilities and transportation systems.
- Cities of developing countries are experiencing most rapid spatial expansions in all regions, and a surge in environmental and ecological change.
- Competition for investment and participation in global economy may lead to deferred improvements in infrastructure and health facilities.

The present research also attempt to suggest following measures if adopted may be helpful for the formulation of plans for sustainable development of Aligarh city and its urban fringe areas.

1. For a multi-level development of cities it should be stressed that, sustainable urban development should include socio-economic and environmental sustainability, i.e. a desire for a general state of urban well-being and a good quality of life for all urban residents.

2. Inoculating a future oriented approach in planning for sustainable development of city and its fringe area because a well planned surrounding area can build up a better city.

3. Sectorwise zonation of city and its metropolitan area adopting a diagnostic approach should be codified and enhanced based on the operational land use activities considering the zoning regulations.
4. In the residential colonies where land use practices are uncontrolled and illegal, should have an option of regulating with the regulations of zonal plan/sector plan/layout plan. Availability of resources must ensure for development and taskforce be created for generating income through realizing taxes.

5. Strict legislations on abandonment of productive agricultural lands and wastelands should be imposed for the construction of public assets, industrial estates and institutions.

6. Banned should be imposed over the practice of strip mining of soil from agricultural lands in fringe areas around the city and formulate alternate filling material in construction such as coal ashes.

7. All of urban wastes should be dumped in non-agricultural lands and should be processed in treatment units and recycled for making bio-fertilizers and other byproducts. There should at least four recycling units in all directions around the city to ease in collection of waste and processing operations.

8. Dumping of coal fly ash in the agricultural fields should be checked and be utilized in construction activity, filling of depressions, brick making, cement industry and other creative uses.

9. Brick kilns should be regulated with proper rules of using earth and they must be located far away from the settlements over non-agricultural lands/wastelands.

10. Rain-water harvesting methods should strictly be applied well before the starting the construction of buildings or other infrastructures in the city.

11. Development of thick green belts along highways, railway lines, new colonies, waste lands, public places and catchment areas of wetlands etc
12. Multifunctional agriculture is an ideal land use system which should be targeted for increasing the agricultural production, and for conservation of soils and water in the urban fringe areas.

13. Development of Agro-Processing Clusters (APCs) will be helpful by encouraging agri-entrepreneurships at village level, preserving the local agriculture, and providing sustainable livelihood through local resource utilization.

14. A proper distribution channel is needed to dilate new agricultural technology among all sections of communities, and provision of opportunities of financial credits for the purchase of improved agricultural machinery.

15. Planning should be done for sustainable management of natural resources that can contribute to socio-economic viability of urban and rural areas, for ensuring livelihood, generating employment and for ensuring food security.

Hence, urban encroachment is a continuous phenomenon. It began with the expansion of cities accelerated more rapidly since the mid of the 20th century. With the beginning of 21st century it has been estimated that, half of the Indian population lives in suburban areas around previously existed cities. The features of urban sprawl, low density land use, heavy reliance on fossil fuels, diverse character of land use, impact on surrounding environment and lack of opportunities are widespread. But the beneficial effects of the process of urban encroachment on rural hinterlands have yet to be fully realized, though more research is currently underway and better results are still awaited.