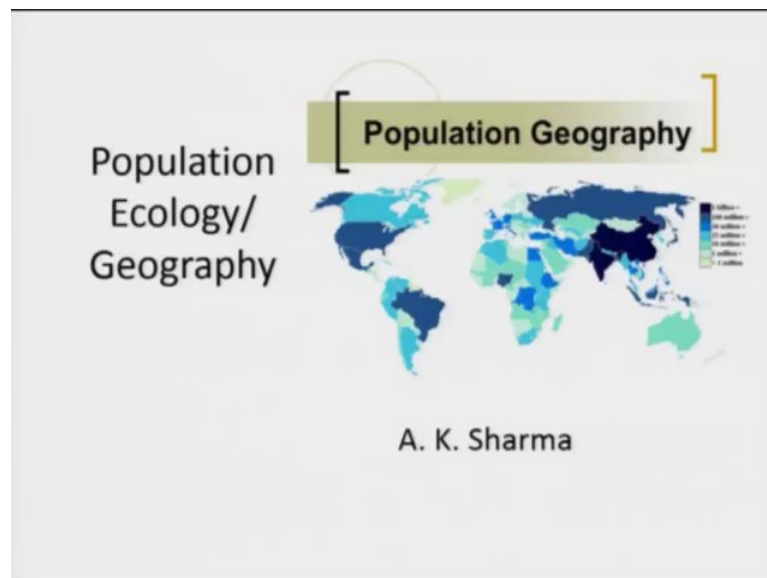


Population Studies
Prof. A. K Sharma
Department of Humanities and Social Sciences
Indian Institute of Technology, Kanpur

Lecture - 02
Population Ecology/Geography

In the first lecture, I simply described the subject matter of population studies. Its scope and what kind of future or jobs, you can expect by doing this course. Now, we will go slightly deeper.

(Refer Slide Time: 00:43)



And this lecture is devoted to relationship between population and ecology or geography. There is a difference between ecology and geography, but I have combined the two terms. Because this is only an introductory lecture and the purpose is to see the connection between population and ecology.

(Refer Slide Time: 01:02)

Ecology

- According to Duncan, ecology refers to the collection of:
 - population,
 - organization,
 - environment, and
 - technology
- Population ecology, therefore, studies the relationship between population size and trends on the one hand, and organization, environment and technology on the other, e.g. the relationship between sustenance organization and fertility

What is ecology? According to Duncan, ecology refers to collection of population, organization; social organization I mean, environment and technology. Population ecology, therefore, studies the relationship between population size and trends on the one hand population factors on the one hand, and organization, environment and technology on the other, for example, the relationship between sustenance organization, mode of production, economic organization, productivity production and distribution of income and fertility. So, economic organization and fertility can be a subject of ecological studies in population; one of the subjects.

(Refer Slide Time: 02:00)

- To quote Poston and Frisbie: "A fundamental tenet of human ecology is that a population redistributes itself through the vital processes and migration to achieve a balance or equilibrium between the size and life chances."
- Life chances are the probabilities of having desired/ valued conditions, goods and services, e.g. low infant mortality, hospital facilities, education, and car ...


To quote Poston, “A fundamental tenet of human ecology is that a population redistributes itself through the vital processes means fertility and mortality and migration to achieve a balance or equilibrium between the size and life chances.” Life chances include the probabilities of having desired or valued resources and conditions, goods and services, such as low infant mortality, hospital facilities, education and say car.

(Refer Slide Time: 02:53)

Organizational and environmental studies

- Require a long time perspective
- Short run and long run impact of green revolution in India
- What mitigates hunger in the short run leads to various forms of misery in the long run
- Club of Rome Study was one of major attempts to study long term consequences of population growth

Source:
<https://www.clubofrome.org/report/the-limits-to-growth/>



Organization and environment studies are done on a long term basis. They require a long time perspective. One of the most famous studies of ecology is the limits to growth. The study is about short run and long run impact of population growth on other requirements of life and an overall quality of environment and impact on survival of human population or ecological studies will generally include short run and long run impact of sustenance organizations such as green revolution in India.

There was a good consequence of green revolution no doubt; but nowadays, we are also facing problems due to green revolution, where deserts fall in the water table and so on in several areas of Punjab, Western UP, where green revolution was a success.

What mitigates hunger in the short run leads to various forms of misery in the long run and this club of Rome study, this club of Rome study was one of the major attempts to study long term consequences of population and arrived at the finding that in the long run, the present population growth cannot be sustained.

(Refer Slide Time: 04:34)

"In the summer of 1970, an international team of researchers at the Massachusetts Institute of Technology began a study of the implications of continued worldwide growth. They examined the five basic factors that determine and, in their interactions, ultimately limit growth on this planet-**POPULATION INCREASE, AGRICULTURAL PRODUCTION, NONRENEWABLE RESOURCE DEPLETION, INDUSTRIAL OUTPUT, AND POLLUTION GENERATION.** The MIT team fed data on these five factors into a global computer model and then tested the behavior of the model under several sets of assumptions to determine alternative patterns for mankind's future. The Limits to Growth is the nontechnical report of their findings. The book contains a message of hope, as well: Man can create a society in which he can live indefinitely on earth if he imposes limits on himself and his production of material goods to achieve a state of global equilibrium with population and production in carefully selected balance.

Source: <https://www.clubofrome.org/report/the-limits-to-growth/>

In the summer of 1970 an international team of researchers at the MIT began a study of relationship between population and environment. They studied relationship between population increase, agricultural production, non-renewable resource depletion, industrial output and pollution generation. The MIT team fed data on these 5 factors into a global computer model.

So, these studies requires simulation computer modelling and then, tested the behaviour and the book contains a message of hope as well, although there is a limit to growth. That man can create a society in which he can live indefinitely on earth if he is important, if he imposes limits on himself and his production of material goods to achieve a state of global equilibrium with population and production in carefully selected balance. So, there are lots of if's and but's and a caution, a warning that do something to control both your population and your material consumption.

(Refer Slide Time: 05:51)

Population and environment

- Two-way relationship
 - population as a dependent variable (DV)
 - population as an independent variable (IV)
- Direct and indirect relationships
- Population growth leads to environmental damage directly due to greater demand on resources and also indirectly due to change in forms of organization causing increase in construction activities

In study of population and environment population appears both; sometimes as a dependent variable and sometimes as independent variable depends on what your hypothesis is and there is direct and indirect relationship means, there are several mediators and moderators between population and environment. Population growth leads to environmental damage directly due to greater demand on resources and also indirectly due to change in forms of organization causing increase in construction activities.

(Refer Slide Time: 06:25)

Optimum population theory

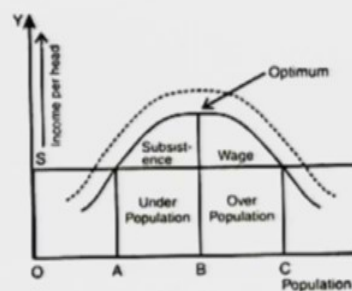


Fig. 1

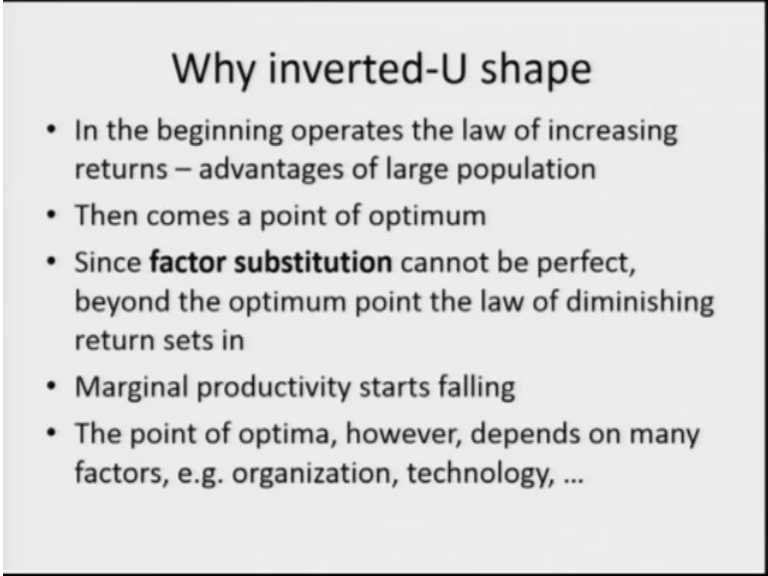
Source: <http://www.economicdiscussion.net/population/the-optimum-theory-of-population-with-diagram/4473>

There is an interesting theory called Optimum population theory. How is, some people say that population growth is good, some people say that population growth is bad. What do we say? Now, according to optimum population theory which takes a balanced view

of the relationship between population and development. Initially, a rise in population is good for development.

Income per head, quality of life, no matter what standard of development you take; as population increases, this also increases. Then, there comes a point beyond which further increase in population leads to fall in per capita income or standard of living or quality of life, that is the optimum point. And a population is at the optimum level, then it is good; but less than that or more than that in both the conditions population can be problematic.

(Refer Slide Time: 07:30)



Why inverted-U shape

- In the beginning operates the law of increasing returns – advantages of large population
- Then comes a point of optimum
- Since **factor substitution** cannot be perfect, beyond the optimum point the law of diminishing return sets in
- Marginal productivity starts falling
- The point of optima, however, depends on many factors, e.g. organization, technology, ...

In the beginning operate the law of increasing returns, more is the population. For example, in basically a very low density desert area, if you increase population, you through fertility rise or through migration that will be good for infrastructure building. So, there are initially law laws of increasing returns and further growth of population is grew but then comes a point of optimum. Malthus was more worried about this part of the population development relationship.

Since, factor substitution cannot be perfect. What is factor substitution? Factor substitution means that the disadvantages of population growth can be partly compensated by technological improvement or by expansion of land, but factor substitution is never perfect.

So, beyond the optimum point, the law of diminishing return sets in and marginal productivity of people starts falling and however, the point of optima depends on many factors organize economic organization, social organization, technology, level of income and so on.

(Refer Slide Time: 08:55)



Impact of population growth

- All consumption requirements and requirements for renewal and non-renewal resources rise
- Conflicts and division of labor
- Urbanism

Impact \propto Population

Now the impact of population growth commonsensical; this is everybody knows that population growth can lead to all consumption requirements, increase if population is growing at 2 percent rate per year. Other factors remaining same, your consumption requirement will also increase at 2 percent rate per year and you require more of renewable and nonrenewable resources. This nonrenewable resources is a special problem. Then, conflicts and division of labour and urbanism, impact depends on the size of population.

(Refer Slide Time: 09:40)

Impact is much greater

- Paul R. Ehrlich and Anne H. Ehrlich equation:
 $I = PAT$
- Impact = Population X Affluence X Technology
(to produce per unit of income)
- You may also add values (Garrett Hardin's concept of cultural carrying capacity)

But it is not simply size of population, from environmental or ecological point of view Ehrlich is suggested that we consider not only population, but also two other things affluence and technology. So, total impact of population rise on environment, on ecology depends on P multiplied by A multiplied by T; here, P is population, A is affluence, T is technology that is required to produce one unit of income.

You may also add some other values; Garret Hardins concept of cultural carrying capacity. You know this optimum population may also be seen from a certain perspective as carrying capacity. What is the carrying 1.3 billion people in India. Have we already exceeded carrying capacity of Indian resources or India or one can say no we can go up to 1.5 billion tikh he; 1.5 billion. But what will happen if population exceeds 1.5 billion should we not prepare ourselves today so that the population size in the future does not exceed 1.5 and moreover, according to Hardins concept of cultural you know this cultural carrying capacity.

Maybe in India, even 2 billion people can survive if people are willing to live at the level at which say people of Somalia or Ethiopia are living. But if you want cultural standards of united states, then one can say that 1.3 which is the two number today itself has exceeded the cultural carrying capacity. We should have had say somewhere around um half of this population.

(Refer Slide Time: 11:46)

James A Swaney, *Journal of Economic Issues*, 1991

I = MEPAT

Not simply I = PAT

M and E stand for **Myths and Entitlements**

Swaney, another economist added one more thing to this PAT equation and that is I equal to MEPAT; M and E stand for myths and entitlements, means the value system something which is quite consistent with the idea of cultural carrying capacity. What are your expectations from development? Everybody talks of development, but what are your expectations from development? Does development mean that the basic needs of everyone are satisfied or does it also mean that everybody every family has two cars? It is not possible at very large numbers to provide two cars to each family, basic sustenance needs can be satisfied.

(Refer Slide Time: 12:45)

Garrett Hardin

- Demographic thermostats
- On tragedy of commons
- Distinction between birth control and population control
- Condition on welfare
- Welfare and population cannot be maximized simultaneously
- Carrying capacity and cultural carrying capacity
- Life boat ethics – earth as a spaceship

So, this is culture is another issue. Garrett Hardin he gave several metaphors, several phrases to relate population to development. One he says that we have a demographic thermostat. People maintain roughly at the same level, if population rises and resources do not change; natural resources remain same then there will be more deaths also. The deaths may appear because of wars, because of epidemics, because of droughts, because of famines, but deaths will occur and that will take care of and population will be balanced again.

If in the recent past for variety of regions, some national some international this thermostat has been disturbed and people or size of populations in several countries has gone much beyond the size for a thermostat to be maintained and the number which in the long term resources of a country can maintain.

He talks of tragedy of commons, which means that commons are unproductive and disadvantageous because everybody wants to draw maximum advantages from commons, but does not behave responsibly. So, when you produce a new baby for example, then much of the cost of the baby educational, health, social is borne by society, but the parent you as parents may gain from having a son in terms of old age security, income utility, power, status advantage and so on. Nobody consider the cost through society, if you consider cost to commons to society also, then your perspective will change.

Condition on welfare; welfare and Hardin also said that two things; welfare and liberal policy regarding population cannot go together either you increase welfare or you increase population. It is not possible at the same time to increase both population and welfare. He also made a difference between carrying capacity of the earth and cultural carrying capacity which I mentioned just now.

And he gave the metaphor of life boat ethics that there is a life boat in which suppose there are 50 people and maybe 20 more can be accommodated. For him, life boat in the lifeboat of developed countries basically and lots of people are drowning in the sea around that life boat and they want to enter. They are looking for entry to the life boat. Now, how many of such people can be welcome and on what basis this was his question of life boat ethics.

(Refer Slide Time: 16:01)

Population geography

- Is closely connected to ecology
- Population geography is a special branch of population ecology in which population variables are studied according to geographic details, e.g. state-wise differentials in population growth and their components and causes
- Sensitivity to context of demographic phenomena has led to area-specific approach in population studies and programmes

Then, there is subject of population geography which is closely connected with ecology. Population geography is a special branch of population ecology in which population variables are studied according to geographical details, state wise for example, state wise differentials in population growth; which states are growing fast, which states are growing slow, where fertility is more. In states like Kerala in general in south; South Indian states fertility is low. In states like Bihar and UP, fertility is high. So, what are its ramifications, for demographic trends, for socioeconomic trends, for political trends, these are the issues of population geography.

Then, sensitivity to context of demographic phenomena has led to you know this area or geography also comes into picture because when we look for appropriate policy mechanism. Then, we find that one single solution cannot be suggested for all states of India or all types of populations, we need area specific approach. So, the area appears again as both dependent variable and independent variable in connections between area and population.

(Refer Slide Time: 17:26)

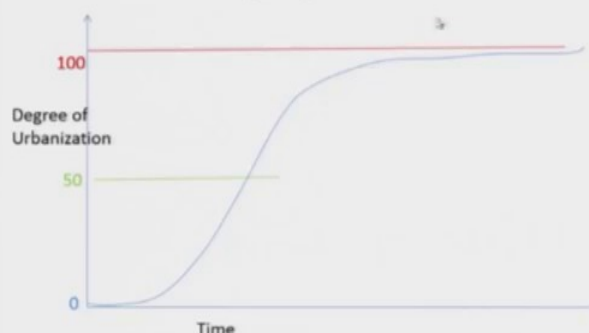
Population geographers are specially interested in

- Levels and trends in urbanization
- Urban concentration
- Rural-urban migration
- Quality of life in rural and urban areas
- City morphology
- Morphological approach to crime and deviance, and other forms of behaviour
- Regional differences in urbanization and its implications for regional disparities

Population geographers are especially interested in levels and trends in urbanization; urban concentration. Then rising density of population in certain specific areas and then, rural to urban migration. Quality of life in rural and urban areas; city morphology; morphological approach to crime and deviance and other forms of behaviour and then regional differences in urbanization and its implications for regional disparities which translates into state wise differences in levels and trends of organization in India. Say comparing Maharashtra with Bihar; Maharashtra is one of the highly urbanized states of India and Bihar is one of the least urbanized states of India.

(Refer Slide Time: 18:21)

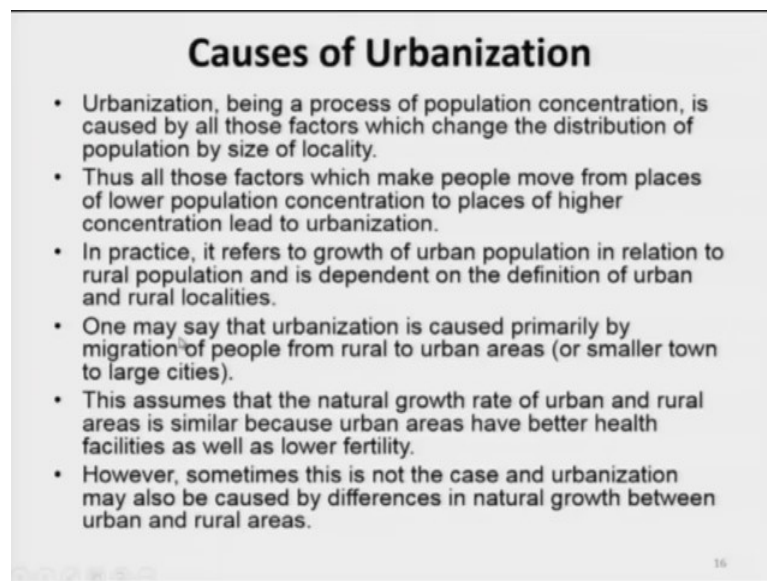
According to one United Nations study, urbanization follows a logistic growth model.



According to one United Nations study, this urbanization follows a logistic trend which means that for a long long time, the level of urbanization remain minimal. As time passes level of urbanization starts rising and further, the rate of growth of urbanization may decline but, a percentage of urban population is constantly rising and it may stop somewhere near 90 percent, 95 percent. Today, if you look at the entire world, then more than 50 percent population of the world is living in urban areas.

In developed countries almost, 90 percent population is living in urban areas and those who live in rural area, they also have access to all the amenities of urban areas. Many less developed countries are lowly urbanized, they have 10 to 15 percent populations living in urban areas and there is a vast distinction between quality of life in urban areas and rural areas.

(Refer Slide Time: 19:42)



Causes of Urbanization

- Urbanization, being a process of population concentration, is caused by all those factors which change the distribution of population by size of locality.
- Thus all those factors which make people move from places of lower population concentration to places of higher concentration lead to urbanization.
- In practice, it refers to growth of urban population in relation to rural population and is dependent on the definition of urban and rural localities.
- One may say that urbanization is caused primarily by migration of people from rural to urban areas (or smaller town to large cities).
- This assumes that the natural growth rate of urban and rural areas is similar because urban areas have better health facilities as well as lower fertility.
- However, sometimes this is not the case and urbanization may also be caused by differences in natural growth between urban and rural areas.

16

What are the causes of this urbanization? Ecologists may ask why is population concentration increasing in certain parts. Urbanisation being a process of population concentration is caused by all those factors which change the distribution of population by size of locality. There are many factors differences in fertility differences in mortality, but most important cause of rural to urban migration is the major factor in urbanization and if you look at Indian scenario, then differences in fertility and mortality also contribute heavily to growth of urban population. But rural to urban population

historically in all countries, less developed countries, developed countries, urbanization is caused primarily by migration of people from rural to urban areas.

Due to both push factors as well as pull factors. Push factors are the factors which compel rural populations to leave their native village and move towards urban areas in search of education, health facilities, status sometimes status because in rural area they are recognized by their achieved traditional social status. In urban areas they become more anonymous. So, there is much more status equality and nobody perceives anybody to be low or high in terms of status or caste or community. So, the that is another reason for rural to urban migration.

This assumed that the natural growth rate which is difference between birth and death rate of urban and rural areas is similar if because urban areas have better health facilities as well as lower fertile. This is only an ideal condition otherwise in our country as I said natural growth rate is also a major factor; almost 50 percent in the growth of population in urban areas and rural to rural migration contributes the other. But ideally in the past in different countries whenever natural growth rate of urban areas goes down, rural areas also goes down and urbanization grows due to migration.

(Refer Slide Time: 22:17)



Rural conditions in flood affected areas are so bad that this woman is forced to migrate to a safer place in some city or urban area, carrying all major all necessary belonging of her household.

(Refer Slide Time: 22:36)

Rural-urban conflict, M Lipton, 1977

- Some political analysts see the relationship between urban and rural areas as exploitative.
- They focus on urban-rural conflict and ways in which urban areas grow at the expense of rural areas.
- According to this thesis, growth of urbanization may not lead to development and growth of all.
- Expansion of urbanization may rather lead to marginalization and exploitation of rural masses.

HSS Department, IIT Kanpur 18

This also leads to rural urban conflict, M Lipton in 1977, wrote a book on Urban-rural conflicts and he and other political analysts see the relationship between urban and rural areas as exploitative; that urban areas exploit rural areas. They focus on urban rural conflict and ways in which urban areas grow at the expense of rural areas.

Its and some of them actually use the Marxist theory of expropriation of surplus value, but in place of just talking about classes, they talk about agricultural categories and industrial categories and show how industrial population or industrialists in urban areas are exploiting the rural population or rural agricultural labourers.

According to this thesis, growth of urbanization may not lead to development and growth of all expansion of urbanization may rather lead to marginalization and exploitation of rural masses. We will talk about relationship between population means growth of urbanization and development in one of the later lectures.

(Refer Slide Time: 24:00)

Dual city

In the less developed countries three things were especially marked:

- Rapid growth of large cities
- Division of city into two different parts, one modern and developed, and the other as traditional and poor
- Overpopulation in the urban areas, particularly large cities, leading to creation of large squatter settlements and slums

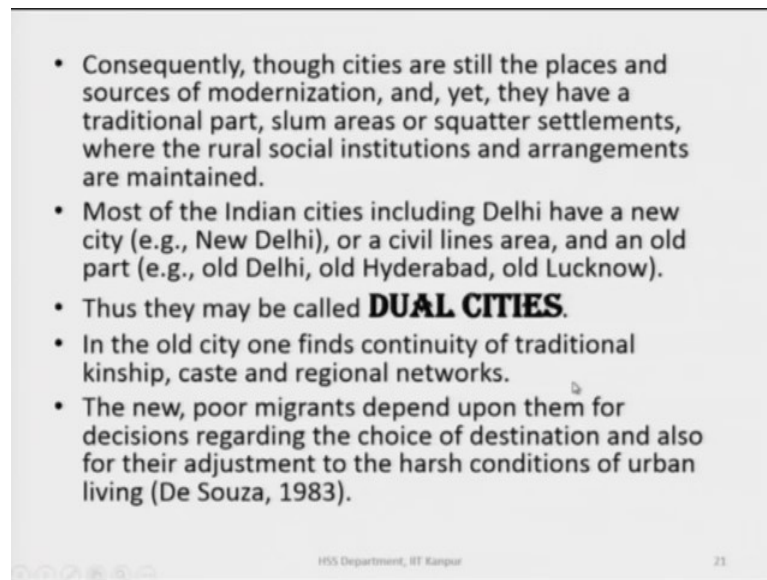
Urbanization has also produced dual cities and colonial policies and exploitation to which Michael Lipton refers and dual city is a modern city in all cities you find a civil line area with modern facilities and a part, where poors, slum dwellers, those in informal sector or traditional population lives.

(Refer Slide Time: 24:27)

- Data show that the large cities are growing faster than the smaller cities. As a matter of fact many tiny towns have experienced a declining trend (Registrar General, 2009).
- This phenomenon produces **city primacy**. i.e., a situation in which large cities have disproportionately more population than smaller cities and towns, making them unmanageable by city planners and requiring large investments to keep them liveable.
- For development planning, a good option would be to develop smaller cities and towns and restrict movement of people towards the largest cities.

There is a concept of city primacy that all urban areas do not increase at the same rate. There are some cities which contain a large chunk of urban population and there are other smaller cities. These cities are called primate cities. Bombay in India is a primate city for example.

(Refer Slide Time: 24:48)



A presentation slide with a light gray background and a black border. It contains a bulleted list of six points. The third point includes the bolded term 'DUAL CITIES'. At the bottom, there is a small navigation bar with icons and the text 'HSS Department, IIT Kanpur' on the left and the slide number '21' on the right.

- Consequently, though cities are still the places and sources of modernization, and, yet, they have a traditional part, slum areas or squatter settlements, where the rural social institutions and arrangements are maintained.
- Most of the Indian cities including Delhi have a new city (e.g., New Delhi), or a civil lines area, and an old part (e.g., old Delhi, old Hyderabad, old Lucknow).
- Thus they may be called **DUAL CITIES**.
- In the old city one finds continuity of traditional kinship, caste and regional networks.
- The new, poor migrants depend upon them for decisions regarding the choice of destination and also for their adjustment to the harsh conditions of urban living (De Souza, 1983).

HSS Department, IIT Kanpur 21

So, dual cities, primate cities in studies of urbanization, we will look at some of these things.

(Refer Slide Time: 24:53)



A presentation slide with a light gray background and a black border. The title 'New concerns' is centered at the top. Below it is a bulleted list of seven points. At the bottom, there is a small navigation bar with icons and the text 'HSS Department, IIT Kanpur' on the left and the slide number '22' on the right.

New concerns

- Growing size of slums, informal sector and its role in modernizing economy
- Influence of kinship, caste, religion and region of origin on the migrants' adaptation to the new situation
- The condition of urban poor and structural and cultural marginalization: income, savings and loan pattern, organization, health, education, welfare and self reliance among the poor
- Slum improvement programmes
- Consequences of urban poverty for women and family
- Identity and social stereotypes

HSS Department, IIT Kanpur 22

Some new concerns of ecology are growth of slums, informal sector and their relationship with caste, religion, region of origin, condition of urban and structural and cultural, marginalization incomes. In the recent times, actually studies of slums have become very important. Health planners, nutritionist, economic planners, those concerned with the quality of housing, water sanitation, urban infrastructure, crime;

everybody is concerned about what is happening to size of slum population and what is happening to these things inside the slum population.

(Refer Slide Time: 25:39)

Based on an ethnographic study in steel town of Bhilai, Parry (2004) writes:

It is true that even forty years on, regional identities continue to be marked in terms, for example, of diet, dress, the worship of deities and the language of home. It is in the 'home' rather than the 'world' that the distinctions are most manifest, and the maintenance of them is significantly gendered. Even after years in Bhilai, the Hindi spoken by many south Indian women remains rudimentary. In the masculine space of the plant, regional ethnicity is the focus of legitimised joking; but outside the topic is more touchy and ethnic stereotyping has a harder edge. Malayalis are clever, cunning and clannish, and always get on; Telugus are feckless and often inebriated, and generally do not. Where there are Bengalis there is *netagiri* (political boss-ism), and where 'Biharis', *dadagiri* (gangsterism). This last identity (which includes people from eastern Uttar Pradesh) is particularly strongly freighted and Bhilai's social problems are routinely laid at their door

HSS Department, IIT Kanpur 23

Ah I will not read this. This actually now due to shortage of time; but they shows how rural-urban size of population, identities and all these things are related.

(Refer Slide Time: 25:56)

Implications of further growth

- Son of soil demands
- Stigma and segregation
- Politics of identity
- Weak governance (soft state – Gunnar Myrdal, Asian Drama)
- Deteriorating quality of life
- Class conflicts
- Increasing role for civil society actors

HSS Department, IIT Kanpur 24

Implications of further growth: son of, if urbanization increases at the rate at which it is increasing, then it can lead to son of soil kind of demands. An unemployment is falling, we say that India is passing through a stage of growth without employment. So, growth

is taking place, but employment is falling. So, when employment falls and there is unemployment among the local youths, naturally the demand for son of soil kind will arise and they will say that outsiders should not be given jobs in their city or in their state.

There will be stigma for differences in linguistic for differences in language, in religion, in ethnicity and in cast. There will be some obvious some sometimes, there are obvious signs of them people can easily recognize that in the city, some people are from other linguistic groups. So, politics of identity arises and as Gunnar Myrdal say that we are a soft state in his famous book Asian Drama, soft state cannot handle the conflicts and violence and problems created by the ethnic differences in urban areas and there may be more of problems of quality of life and class conflicts. Therefore, the increasing role for civil society.

Actually, what this lecture shows that population is a matter of some concern. It is a matter of concern to developmentalists. It is a matter of concern to urban planners and due to population growth and rising level of urbanization. There is increase in exploitation or appropriation of surplus labour. So, this is a political. Ecological issues are social, economic, political and psychological and cultural, anthropological. We will look at these issues as this course develops further.

Thank you.