Course Name: BCA / BBA / BCOM
Subject Name:
Social Science

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Unit 1st

Definition of sociology

Sociology' which had once been treated as social philosophy, or the philosophy of the history, emerged as an independent social science in 19th century. Auguste Comte, a Frenchman, is traditionally considered to be the father of sociology. Comte is accredited with the coining of the term sociology (in 1839). "Sociology" is composed of two words: Socinus, meaning companion or associate; and 'logos', meaning science or study. The etymological meaning of "sociology" is thus the science of society. John Stuart Mill, another social thinker and philosopher of the 19th century, proposed the word ethology for this new science. Herbert Spencer developed his systematic study of society and adopted the word "sociology" in his works. With the contributions of Spencer and others it (sociology) became the permanent name of the new science.

The question 'what is sociology' is indeed, a question pertaining to the definition of sociology. No student can rightfully be expected to enter on a field of study which is totally undefined or unbounded. At the same time, it is not an easy task to set some fixed limits to a field of study. It is true in the case of sociology. Hence it is difficult to give a brief and a comprehensive definition of sociology.

Sociology has been defined in a number of ways by different sociologists. No single definition has yet been accepted as completely satisfactory. In fact, there are lots of definitions of sociology as there are sociologists. For our purpose of study a few definitions may be cited here.

1. Auguste Comete, the founding father of sociology, defines sociology as the science of social phenomena "subject to natural and invariable laws, the discovery of which is the object of investigation".
2. Kingsley Davis says that "Sociology is a general science of society".
3. Harry M. Johnson opines that "sociology is the science that deals with social groups".
4. Emile Durkheim: "Science of social institutions".
5. Park regards sociology as "the science of collective behavior".
6. Small defines sociology as "the science of social relationships".
7. Marshal Jones defines sociology as "the study of man-in-relationship-to-men".
8. Ogburn and Nimkoff: "Sociology is the scientific study of social life".
9. Franklin Henry Giddings defines sociology as "the science of social phenomena".
10. Henry Fairchild: "Sociology is the study of man and his human environment in their relations to each other".
11. Max Weber defines sociology as “the science which attempts the interpretative understanding of social action in order thereby to arrive at a casual explanation of its course and effects".
12. Alex Inkeles says, "Sociology is the study of systems of social action and of their inter-relations".

A careful examination of various definitions cited above, makes it evident that sociologists differ in their opinion about definition of sociology. Their divergent views about the definition of sociology only reveal their distinct approaches to its study. However, the common idea underlying all the definitions mentioned above is that sociology is concerned with man, his social relations and his society.

Concepts of Sociology

We have explained in details the various terms used in Sociology. Check out the aphetically listed terms of sociology for your reference. If there are any terms commonly used in Sociology and that have not been explained in our list of Sociology Terms, please write to us and we will add it to the list of terms of sociology for your benefit. After all it is the basic concepts of any subject that requires clarity and if your basic concepts of Sociology are not clear you are bound to remain unclear with many topics.

Important of Sociology

Sociology is important because it explains how people interact as groups in society. This can lead to understanding and acceptance of different cultures.

Relation of sociology with other social science

Sociology deals with society [people]; how people interact, their culture, norms, values just like other social sciences like psychology, economics, psychology which also deal with people and how they behave, their mental processes.

There is also a relationship between sociology and economics which is another social science. Economics deals with the production of goods and services and how they are distributed to people just like sociology which also considers how the goods are distributed to members of the society.

Sciences related to sociology are social sciences. Social science are sciences which deal with people and have the following characteristics; observable, measurable, practical, factual.

psychology and sociology link on that they all deal with the behavior of people, psychology deals with the behavior of people and their mental process just like sociology which also seek to understand how people's behavior affect society.

Anthropology and sociology also deal with society but the only difference is that social anthropology mainly considers small states and their culture but their area of studies is basically the same.

Sociology and political science are also related in the sense that they both concern the welfare of people in a society. Political science basically deals with the distribution of

power and the exercise of power, democracy, dictatorship, and communism, how people vote etc.

History is another social science which is related to sociology. History primarily deals with past events and how they affected society e.g. how the colonization of Africa underdeveloped Africa. Sociology on the other end will be concerned with how people interacted, how culture was affected etc during the colonization and the present.

Geography can also be a social science which deals with society just like sociology. The population studies, demography, health and environment are all geographical studies which deal with society which are also inter-related to sociology as a field of study.

Group

1. A collection of individuals who have regular contact and frequent interaction, mutual influence, common feeling of camaraderie, and who work together to achieve a common set of goals.

Community

1. Self-organized network of people with common agenda, cause, or interest, who collaborate by sharing ideas, information, and other resources. Virtual communities consist of participants in online discussions on topics of mutual concern, or of those who frequent certain websites.
2. Cluster of common interests that arise from association.

Institution

1. Establishment, foundation, or organization created to pursue a particular type of endeavor, such as banking by a financial institution.
2. Consistent and organized pattern of behavior or activities (established by law or custom) that is self-regulating in accordance with generally accepted norms. For example, political institutions are involved with (and regulate) competition for power; and economic institutions (such as markets) encourage and regulate production and distribution of goods and services.

Organization

A social unit of people systematically structured and managed to meet a need or to pursue collective goals on a continuing basis. All organizations have a management structure that determines relationships between functions and positions, and subdivides and delegates roles, responsibilities, and authority to carry out defined tasks. Organizations are open systems in that they affect and are affected by the environment beyond their boundaries.

Society

A **society**, or a **human society**, is a group of people related to each other through persistent relations, or a large social grouping sharing the same geographical or virtual

territory, subject to the same political authority and dominant cultural expectations. Human societies are characterized by patterns of relationships (social relations) between individuals who share a distinctive culture and institutions; a given society may be described as the sum total of such relationships among its constituent members. In the social sciences, a larger society often evinces stratification and/or dominance patterns in subgroups.

Insofar as it is collaborative, a society can enable its members to benefit in ways that would not otherwise be possible on an individual basis; both individual and social (common) benefits can thus be distinguished, or in many cases found to overlap.

A society can also consist of like-minded people governed by their own norms and values within a dominant, larger society. This is sometimes referred to as a subculture, a term used extensively within criminology.

More broadly, a society may be described as an economic, social, or industrial infrastructure, made up of a varied collection of individuals. Members of a society may be from different ethnic groups. A society can be a particular ethnic group, such as the Saxons; a nation state, such as Bhutan; or a broader cultural group, such as a Western society. The word *society* may also refer to an organized voluntary association of people for religious, benevolent, cultural, scientific, political, patriotic, or other purposes. A "society" may even, though more by means of metaphor refer to a social organism such as an ant colony or any cooperative aggregate such as, for example, in some formulations of artificial intelligence.

Humanity

“A set of strengths focused on “tending and befriending others”

Biosphere

The **biosphere** is the global sum of all ecosystems. It can also be called the zone of life on Earth, a closed (apart from solar and cosmic radiation), and self-regulating system. From the broadest biophysiological point of view, the biosphere is the global ecological system integrating all living beings and their relationships, including their interaction with the elements of the lithosphere, hydrosphere, and atmosphere. The biosphere is postulated to have evolved, beginning through a process of biogenesis or bioprocess, at least some 3.5 billion years ago.

Their utility

Social science is the science of collective behavior. Groups, community, institution; organization and humanity are important components of it. So the study of these significant elements makes us aware about our livings standard of ourselves. It produces

proper manners to understand social behavior and social relation with us. So, we can say that these are the significant utility of it.

Meaning of Family

We are never given a chance to choose a family. May be that's why knowing, understanding and learning the meaning of family becomes essential for us. We are all born with a family. Family is essentially made of those people who look after, who play a crucial role in our upbringing and who teach us such lessons in life, which can never be learned through any textbook. We assimilate the basics of discipline and responsibilities from our family relationships.

What Constitutes a Family?

Mother
Your mother brings you into this life. By creating you she gives you the chance to live a life. She looks after you, every breathing moment of her life, thus imbibing the meaning of love and care. As her love oscillates from unconditional to tough love it helps you understand your flaws, strengths, your limits and capabilities. A mother is the one with whom you make your first bond.

Father
He is the first man in your life and the one who knows the how to fix for every problem. He may not be in most of the photographs taken at family picnics as he is the taking the shots. He not just provides a financial support, but also an emotional one. The role play of a father, teaches diligence, responsibility, dedication and dependability. Through his actions, he teaches the meaning of hard work and perseverance.

Siblings
Siblings are the indispensable part of your life. No matter how much you fight with them, get angry with them, hate their ways of living or are jealous of them, they come to open the 'never red before' chapters of your life. I have a twin sister. Though we are fraternal, we have always been compared in terms of our skin color, height, intellect and so on and so forth. But, it is this comparison that has helped me see, us, as different individuals, born together for a purpose, way above shallow measurements of being 'like the other one'. Most importantly, it has taught me to share, to love and to be there for someone unassailably. I owe my virtues of patience, tolerance and if it's not self-praising, my ability to stand for someone you love, to her. It is living with siblings that make life a fun roller coaster full of ups, downs, turns, twists, laughter and love.

Relatives
Relatives are the support system of the family. In times of crisis and in times of happiness, no matter what situation you are in, you always find relatives by your side to help you come out of it. Relatives share the burden of your sorrow and grief and double the essence of happiness.

Family Values

they are the building blocks of a family. Family values are governed by the social beliefs.

Family values, set the norms of behavior within a family. It a set of rules that every family abides by. Family values are guidelines, that decide what is right and what is wrong. There sometimes can be friction between the young and the elder members of the family. But it is this friction that gives the scope for reasoning, understanding, patience and tolerance. A family with the believes, in explaining the logic of doing and not doing things to their child, brings up a person with the right thinking ability. In most families, where the elders are usually dominating, the child fails to understand, the real meaning of values.

The meaning of our family cannot be put into a limit of words. It is an experience that one undergoes, all through the lifetime. A family, cannot be touched, but can be felt in honest contemplations of the mind. The meaning of a family is not just limited to the immediate family you are born with. If it was so myopic, then what would the orphans call a family? I remember a scene from 'The Kid', a legendary movie by Charlie Chaplin. He picks up a small kid off the street to pelt stones at the windows in the vicinity, so that he can fix them up and make money. When the policemen figure this out, they decide to take the child away. It is at this intersection, that the bond between the kid and the tramp (Charlie Chaplin), comes across as the protector (father) and the helpless child, though they are biologically related. What I mean is, a family, is the one, who belongs to you in time of need and joy and helps you grow up to make a family of your own, one day.

Social class

Social class (or simply "class") is a set of concepts in the social sciences and political theory centered on models of social stratification in which people are grouped into a set of hierarchical social categories.

Class is an essential object of analysis for sociologists, political scientists, anthropologists and social historians. However, there is not a consensus on the best definition of the term "class", and the term has different contextual meanings. In common parlance, the term "social class," is usually synonymous with "socio-economic class," defined as: "people having the same social, economic, or educational status," e.g., "the working class"; "an emerging professional class."

The term "class" is etymologically derived from the Latin *classis*, which was used by census takers to categorize citizens by wealth, in order to determine military service obligations.

In the late 18th century, the term "class" began to replace classifications such as estates, rank, and orders as the primary means of organizing society into hierarchical divisions. This corresponded to a general decrease in significance ascribed to hereditary characteristics, and increase in the significance of wealth and income as indicators of position in the social hierarchy.

Clan

Clan is a group of people united by actual or perceived kinship and descent. Even if lineage details are unknown, clan members may be organized around a founding member or apical ancestor. The kinship-based bonds may be symbolical, whereby the clan shares a "stipulated" common ancestor that is a symbol of the clan's unity. When this ancestor is not human, it is referred to as an animal an totem. Clans can be most easily described as tribes or sub-groups of tribes. The word clan is derived from 'clan' meaning 'family' in the Irish and Scottish Gaelic languages. The word was taken into English about 1425 as a label for the tribal nature of Irish and Scottish Gaelic society. The Gaelic term for **clan** is *fine* [fin]. Clans preceded more centralized forms of community organization and government; they are located in every country. Members may identify with a coat of arms or other symbol to show they are an independent clan.

In different cultures and situations, a clan may mean the same thing as other kin-based groups, such as tribes, castes, and bands. Often, the distinguishing factor is that a clan is a smaller part of a larger society such as a tribe, a chiefdom, or a state. Examples include Irish, Scottish, Chinese, Japanese clans, Rajput clans, Nair Clan or Malayala Kshatriya Clan in India and Pakistan, which exist as kin groups within their respective nations. Note, however, that tribes and bands can also be components of larger societies. However, the early Norse clans, the *ætter*, cannot be translated with *tribe* or *band*, and consequently they are often translated as *house* or *line*. The Biblical tribes of Israel were composed of many clans,Arab clans are small groups within Arab society. Ojibwa bands are smaller parts of the Ojibwa tribe or people in North America, as one example of the many Native American peoples distinguished by language and culture, most having clans and bands as the basic kinship organizations. In some cases more than one tribe recognized each other's clans; for instance, both the Chickasaw and Choctaw tribes had fox and bear clans whose membership could supersede the tribe.[*citation needed*]

Apart from these different historical traditions of kinship, conceptual confusion arises from colloquial usages of the term. In post-Soviet countries, for example, it is quite common to speak of "clans" in reference to informal networks within the economic and

political sphere. This usage reflects the assumption that their members act towards each other in a particularly close and mutually supportive way approximating the solidarity among kinsmen.

Polish clans differ from most others as they are a collection of families who bear the same coat of arms, as opposed to claiming a common descent. This is discussed under the topic of Polish Heraldry.

Clans in indigenous societies are likely to be exogamous, meaning that their members cannot marry one another. In some societies, clans may have an official leader such as a chieftain or patriarch; in others, leadership positions may have to be achieved, or people may say that 'elders' make decisions. There are multiple closely related clans in the Indian sub-continent, especially south India.

Tribe

A **tribe** is viewed, historically or developmentally, as a social group existing before the development of, or outside of, states. Many anthropologists used the term *tribal society* to refer to societies organized largely on the basis of kinship, especially corporate descent groups (see clan and kinship).

Some theorists hold that tribes represent a stage in social evolution intermediate between bands and states. Other theorists argue that tribes developed after, and must be understood in terms of their relationship to, states.

'Tribe' is a contested term due to its roots in colonial anthropological foundations and the connotations that these hierarchical definitions have. It is common practice to use alternative terms like 'ethnic group', or nation.

Marriage

Marriage (also called **matrimony** or **wedlock**) is a social union or legal contract between people called a spouse that creates kinship. The definition of marriage varies according to different cultures, but is usually an institution in which interpersonal relationships, usually intimate and sexual, are acknowledged. Such a union is often formalized via a wedding ceremony. In terms of legal recognition, most sovereign states and other jurisdictions limit marriage to two persons of opposite sex or gender in the gender binary, and some of these allow polygynous marriage. In the 21st century, several countries and some other jurisdictions have legalized same-sex marriage. In some cultures, marriage is recommended or compulsory before pursuing any sexual activity.

People marry for many reasons, including: legal, social, libidinal, emotional, financial, spiritual, and religious. These might include arranged marriages, family obligations, the legal establishment of a nuclear family unit, the legal protection of children and public

declaration of commitment. The act of marriage usually creates normative or legal obligations between the individuals involved. Some cultures allow the dissolution of marriage through divorce or annulment. Polygamous marriages may also occur in spite of national laws.

Marriage can be recognized by a state, an organization, a religious authority, a tribal group, a local community or peers. It is often viewed as a contract. Civil marriage is the legal concept of marriage as a governmental institution irrespective of religious affiliation, in accordance with marriage laws of the jurisdiction. Forced marriages are

Illegal in some jurisdictions. Surveys show that people who are married are more likely to be happy than those who are not married.

Unit 2nd

Socialization

Socialization is simply the process by which we become human social beings. George Herbert Mead and Charles Cooley (from the "Chicago School") contributed the Symbolic Interactionism perspective-most widely used today by sociologists. Mead and Cooley focused on how all the symbol-based interactions we have with others shape and form our self, our roles, our becoming "human," and ultimately our experiencing socialization throughout our life stages. Socialization is the process by which people learn characteristics of their group's norms, values, attitudes, and behaviors.

Newborns are not born human—at least not in the social or emotional sense of being human. They have to learn all the nuances of proper behavior, how to meet expectations for what is expected of them, and everything else needed to become a member of society. A newborn in the presence of others, interacting with family and friends

typically acquires their socialization by the time they reach young adulthood.

From the first moments of life, children begin a process of socialization wherein parents, family, and friends establish an infant's Social Construction of Reality, or what people define as real because of their background assumptions and life experiences with others. An average US child's social construction of reality includes: knowledge that he or she belongs, can depend on others to meet their needs, and has privileges and obligations that accompany membership in their family and community. In a typical set of social circumstances, children grow up through a predictable set of life stages: infancy, preschool, K-12 school years, young adulthood, adulthood, middle adulthood, and finally later-life adulthood. Most will leave home as young adults, find a spouse or life partner in their mid-to late 20s and work in a job for pay. To expect that of the average US Child is normal.

Three Levels of Socialization

Also when discussing the average US child, it's safe to say that the most important socialization takes place early in life and in identifiable levels. Primary socialization typically begins at birth and moves forward until the beginning of the school years. Primary Socialization includes all the ways the newborn is molded into a social being capable of interacting in and meeting the expectations of society. Most primary socialization is facilitated by the family, friends, day care, and to a certain degree various forms of media. Children watch about 3 hours of TV per day (by the time the average child attends kindergarten she has watched about 5,000 hours of TV). They also play video games, surf the Internet, play with friends, and read.

Children learn how to talk, interact with others, share, manage frustrations, follow the "rules", and grow up to be like older family and friends they know. When they live up to expectations they are "big boys and girls," when they don't they are naughty. In the early years, tremendous attention is required in the safety and nurturance of infants. As they begin to walk and talk they learn to communicate their needs and wants and to feed and clothe themselves. Younger children do not have strong abstract reasoning skills until adolescence, so they rely heavily on the judgment of their caregivers. Most importantly, they form significant attachments to the older people who care for them.

Around age 4-5 pre-school and kindergarten are presented as expectations for the children. Once they begin their schooling, they begin another different level of socialization. Secondary Socialization occurs in later childhood and adolescence when children go to school and come under the influence of non-family members. This level runs concurrently with primary socialization. Children realize at school that they are judged for their performance now and are no longer accepted unconditionally. In fact, to obtain approval from teachers and school employees a tremendous amount of conformity is required—this is in contrast to having been accepted at home for being "mommy's little man or woman." Now, as students, children have to learn to belong and cooperate in large groups. They learn a new culture that extends beyond their narrow family culture and that has complexities and challenges that require effort on their part and that create stressors for the children. By the time of graduation from high school the average US child has attended 15,000 hours of school away from home. They've also probably watched 15,000 hours of TV, and spent 5-10,000 playing (video games, friends, Internet, text messaging, etc.).

Friends, class mates, and peers become increasingly important in the lives of children in their secondary educational stage of socialization. Most 0-5 year olds yearn for their parents and family member's affection and approval. By the time of pre-teen years, the desire for family diminishes and the yearning now becomes for friends and peers. Parents often lament the loss of influence over their children once the teen years arrive. Studies show that parents preserve at least some of their influence over their children by influencing their children's peers. Parents who host parties, excursions, and get-togethers find that their relationship with their children's friends keeps them better connected to their children. They learn that they can persuade their children at times through the peers.

The K-12 schooling years are brutal in terms of peer pressures. Often, people live much of their adult lives under the labels they were given in high school. Then it happens. You've probably already done this—graduation! Many new high school graduates face the strikingly harsh realities of adulthood shortly after graduation. Anomie often follows and it takes months and years at times for young adults to discover new regulating norms which ground them back into expectable routines of life.

The third level of socialization includes college, work, marriage/significant relationships, and a variety of adult roles and adventures. Adult Socialization occurs as we assume adult roles such as wife/husband/employee/etc. We adapt to new roles which meet our needs and wants throughout the adult life course. Freshmen in college, new recruits in the military, volunteers for Peace Corps and Vista, employees, missionaries, travelers, and others find themselves following the same game plan that lead to their success during their primary and secondary socialization years—find out what's expected and strive to reach those expectations.

Though, we articulate an average life course as follows: infancy, preschool, K-12 school years, young adulthood, adulthood, middle adulthood, and finally later-life adulthood; few life paths conform perfectly to it. People die of heart disease, cancer, brain and lung diseases, and accidents. People marry and divorce, become parents, or finishes raising their children. They start a career and change after 5-10 years to another, and later even another. They go bankrupt, win lotteries, or simply pay off their mortgages. In each change that comes into their life, they find themselves adapting to new roles, new expectations, and new limitations. Socialization is an ongoing process for everyone until the day they die.

Social Stratification

Social inequality is a universal phenomenon in all societies. It can exist either in form of a hierarchy of groups or individuals or it may exist without the creation of a hierarchy. In the former case it is called social hierarchy. While in the latter case it is known as social differentiation for in almost all societies men and women are treated unequally. If social inequality manifests itself in the form of a hierarchy involving ranking of groups then it is known as social stratification, thus social stratification is a particular case of the social inequality. Social stratification is essentially a group phenomenon. According to Ogburn and Nimkoff the process by which individuals and groups are ranked in a more or less enduring hierarchy of status is known as stratification. Melvin Tumin defines social stratification as an arrangement of any social group or society into a hierarchy of positions that are unequal with regard to power, property, social evaluation and psychic gratification. According to Lundberg a stratified society is one marked by inequality by differences among people that are evaluated by them as being lower and higher.

Definition and process social change

When the Appalachian Community Fund was brought into being 20 years ago, its founders were individuals who had bonds and histories with struggles of the region and who lived and worked in the region -- farmers, teachers, miners, housewives, organizers,

preachers, educators, grassroots leaders. ACF was envisioned to be a source of money specifically targeted to the central Appalachian region because of its severe isolation and economic depression. Social change as a process, a goal, and a guiding principle is the foundation for ACF's purpose and work. This perspective and accompanying strategy is reflected in a two-pronged approach to meeting the needs of communities:

- Self-determination and support of local leadership development, community identified solutions, and empowerment and Understanding and trying to act on the causes of problems and oppressions while addressing the immediate needs identified by the local community organizations.
- Social change strategies depend on people's self-determination and empowerment, local and grassroots leadership development and support, and a common understanding of the causes of the problems. ACF continues to be guided by people grounded in the communities and work of the region who developed this working definition of social change.

ACF's Definition of Social Change

The Appalachian Community Fund defines social change as the movement of people toward the establishment of environmental, economic, and social justice and the redistribution of wealth, power, and resources as indicated by evidence of:

- Organizing and action led by people working to control their own lives;
- Educating communities about the root causes of oppression and injustice;
- Eliminating barriers to full participation in society (i.e. racism, sexism, classism, homophobia, ageism, ablesim, and exclusion from decision-making processes);
- Focusing on efforts to change cultural, social, political, and economic systems and institutions that create, accommodate, and perpetuate social injustice;
- Creating and modeling democratic cultural, social, political, and economic systems;
- Connecting local issues with national and global concerns; and
- Networking, collaborating, and cooperating with other change agents working toward similar goals.

ACF supports many different social change issues and approaches including:

- **Educational opportunity and equity** increased funding for schools, higher education opportunities, and racial diversity among teachers and administrators.
- **Environmental action** opposing unregulated practices of Mountain Top Removal, a process of blasting the tops off of mountains to get to the coal seam which destroys forests and mountains, creates dangerous rock slides and waste piles, and pollutes and dams up streams and creeks.
- **Cultural and artistic participation for social change** writing and performing historical and political drama and music, preserving and affirming traditional arts and crafts, multi-cultural sharing and work among Central Appalachia's diverse

populations including untold stories of struggle in African -American and other underserved communities.

- **Community based economic development and opportunity** building markets and skills in rural communities through local solutions, local products, community kitchens, and improved economic development policies and practices.
- **Women and girls issues** support and healing for survivors of domestic violence, overcoming isolation, gender barriers, and access to continuing education.
- **Multi-cultural and racial justice** programs in support of new immigrant communities, and programs and processes for racial equality and healing
- **Community media** community-owned and staffed radio stations, newspapers, film and video by and for communities, increased policy work to address media control.
- **Youth outreach** - programs designed by youth for youth to increase their skills and to address the needs of youth in academics and public and community services.
- **Health care and child care** making child care and health care affordable and accessible for everyone.
- **Non-violent communities** - organizing to end police brutality, increase democratic participation, institute policies and practices against hate crimes and homophobia.

Civil liberties and human rights organizing to ensure civil liberties and human rights are upheld for all people, including those of immigrant residents and migrant communities.

Characteristics of Indian Culture

At the first press conference after his election, Indian President Abdul Kalam emphasized the need for the Indian younger generation to learn scientific knowledge and also correct values from their older generations, and added that India should get rid of poverty and become a developed country in twenty years.

Why did President Kalam mention Indian values anew in his first press conference? This question deserves studying. But what's more important is to clarify what Indian values are. Before we start, we should have some knowledge about Indian culture and its characteristics. The reason is Indian values have taken shape in the fertile soil of Indian culture, which has cultivated the specific values of Indian people and made them differentiate from those of Chinese culture and Western culture. These are issues affording food for thought and research.

CHARACTERISTICS OF INDIAN CULTURE

Being an Oriental ancient civilization, India has a history of 5000 years. And its culture, extensive, profound and mysterious, has made immeasurable contributions to the world

progress and civilization. Its distinct characteristics and personalities have made scholars and experts of academia today excited and confused, arousing their interest in probing the mysteries inside. But no consensus has been reached among them up to now. Some experts divide the characteristics of Indian culture into eight aspects, while others argue that there are no more than three.

I would argue that the characteristics of one specific culture must meet two requirements as follows. One is commonality. The Indian cultural system is made up of numerous cultural elements. So the characteristics of Indian culture must be incarnated in each of the cultural elements with their own personalities, representing the mainstream of Indian culture. The other is individuality that represents the uniqueness of Indian culture and plays the role irreplaceable in the system. I would sort the characteristics of Indian culture into four categories, using the two criteria mentioned above. They are religiosity, diversity, inclusiveness and regionalism.

Religiosity

India is a religious country, and almost all the people sincerely believe in religion. Religion touches every corner of the Indian society and the soul of all the ordinary people, thus maintaining tight and close links with Indian society, politics, economy, military, art and literature. Indian people witness the great and irresistible pacts imposed by religion on them in every aspect of life. In short, ‘Life’ will have no meaning without religion. In the first few years since independence, the Indian Government headed by Nehru took the policy of secularism as the fundamental one of developing economy, getting rid of poverty and stabilizing the society in order to mitigate the conflicts among different religious sects. The Indian National Congress, however, didn’t comply with this policy consistently due to the deep and vast influence of religion on the Indian society. It was unable to fully pursue secularism and sometimes even made use of religion to meet some interests of the government due to the interweaving religious and caste contradictions. It’s the incomplete secularism policy of the Congress that led to the soaring power and influence of Hinduism throughout the 1980s. The Bharatiya Janata Party (BJP) used this as an excuse to attack the Congress’s secularist program and dismissed it as "camouflaged secularism" because it couldn’t represent the interests of Hindus. The Muslims, for their part, also didn’t consider this policy in their interests. This is one of the main factors that led to the humiliating defeat of the Congress Party (despite a history of more than 100 years) in the 1990 election.

If we try to analyze and do some studies on the language, literature, art, music, dance and sculpture of India, it will not be hard to find that they are all centered on religion, both in form and content. Even the legislation of the country, the shaping of individual morals and traditional customs and habits of ethnic groups are developed under the influence of religion. Religion has been fully integrated into Indian culture. In short, there will be no Indian culture without religion. For example, in literature there are many works regarded by the academia as the purely religious literature such as the well-known Pancatantra, which was edited and disseminated by religious figures especially for their descendants and is full of passionate feelings that preached the religious spirit.

Even in the liberation movement of the Indian people against the British colonial rule and for national freedom and independence, the idea of nonviolence in the movement of nonviolence and non-cooperation advocated by their greatest national hero Mahatma Gandhi also originated from the benevolence and humanity of Indian religious thoughts. It was from the tenets of Hinduism such as "perseverance in truth", "abstention from killing" and "self-renunciation" that the ‘nonviolent’ thinking derived, with which Mahatma Gandhi invented the unique path in the struggle for national independence and liberation, and won the final victory and established the Republic of Hindustan.

If we observe the life experience of Mahatma Gandhi closely, we can see clearly that he persisted in using religious tenets through his whole life to instigate people to take part in the struggle against British colonists. For he deemed that "politics will lose its soul without religion". He also strongly believed that the strength of patriotism, the willingness to sacrifice and the national dignity could be unbounded, if aroused by religious thoughts. The reason was they represented the intrinsic elements at the very core of Indian culture with a history of 5000 years and the highest ideal the Indian people pursue. For that reason, he held a firm belief that the religious and moral strength of ‘nonviolence’ thinking could eventually force the British colonists to correct their errors since they also cherished justice in nature.

Diversity

Diversity stands out as one of the most prominent characteristics of the Indian cultural system. Within this system, there are different cultural elements such as Hellenic culture, Islamic culture, Persian culture, English culture and Chinese culture. The reason for this diversity is multifaceted and the most important factor is the alien cultures brought to India by invaders. For example, the Indian Islamic culture was launched after Babur defeated Sultan Ibrahim Lodi, the ruler of Delhi, in 1526 and founded the Mogul empire. Babur, who had a Mongolian origin and came from Central Asia, was one of the descendants of the Turkish conqueror Timur. The introduction of English culture into India was completed after the British colonists invaded India and imposed colonial rule on it, which lasted for 200 years. Only the spread of Chinese culture into the subcontinent had occurred by peaceful means. Moreover, the friendly cultural exchanges between the two sides have been lasting for several thousand years. This is a matter for renewed collaboration on both sides. As Prof. Ji Xianlin put it, "it’s rare in the world history for two countries like China and India to have a history of cultural communications and friendly interactions for at least 2000 years”

Even in Indian pure vernacular cultures, there are different types of vernacular cultures with different characteristics resulting from varying periods, conditions and environments for subsistence and development. They include Vedic culture, Aryan culture, Dravidian culture, Brahmanic culture, Marathi culture, Punjabi culture, Assamese culture, if defined by time period and linguistic area. They include Brahmanic culture, Buddhist culture, Indian Islamic culture, Jain culture, Christian culture, Sikh culture and Bahai culture that rose in the modern times, if defined by religious sects. It is the diversity of Indian culture

that exhibits its antiquity, brilliance and glory, making it without parallel in the whole world.

Inclusiveness

Inclusiveness is another salient characteristic of Indian culture that distinguishes it from other cultures. Of all kinds of local cultures, linguistic cultures and religious cultures of India in history, each contains a variety of elements in part from alien cultures. I have experienced it deeply since I started learning Hindi and engaging in the study of Indian culture and South Asian affairs several decades ago. Although all the major languages of the world have loanwords and alien elements, which accords with the law of linguistic development to realize their functions through constant assimilation and creation, Hindi is most salient in this respect. I want to take this as an example to prove the value and universality of the inclusiveness of Indian culture. The constituent elements of Hindi that my colleagues and I have studied are summed up as follows:

Every language has loanwords and alien elements, but those of Hindi are unique. The analysis of the etymology of Hindi shows that Hindi absorbs many words from English, Sanskrit, Persian and Arabic and even a few from Turkish, besides its own derivations. All these words integrate into the vocabulary of Hindi, perfectly representing the contents of Hindi. If we open a Hindi-Chinese dictionary, we will find that the etymologies of many words are given at the end of the entries, indicating their origins, either from English, or Persian, or Sanskrit, etc. There are also compounds, either made up of a Hindi word and one from a foreign language or composed by two alien words. The reconfiguration of words from different languages not only enriches and enhances the expression of Hindi but also enables it to express meanings that didn’t exist in Hindi before. For instance, the word "contract" and the word "separation" are both combinations of Arabic and Persian words so that they are capable of expressing meanings more accurately.

The assimilation of English by Hindi is manifested not only in its vocabulary but also in its absorption and broad use of English grammar and punctuation. English has left a great impact on Hindi, especially modern Hindi. Owing to the influence of English and its absorption and use of English, the capacity of Hindi is further enlarged both in depth and breadth and keeps up with the modern era, thus evolving for a prosperous future. The assimilation can be sorted into two aspects. First, there are many loanwords from English. The linguistic culture brought by the British after they entered India had many words to represent new things with no equivalent in Hindi. Consequently, Indian people had to copy the pronunciations and meanings from English in order to represent things absent or unrecognized in India. Second, there are some paraphrased words and mixed words. Paraphrased words are those created by using Hindi’s own linguistic materials and transplanting the meanings of English words according to its word-building rules. Mixed words are those words or phrases that integrate the borrowed components from English with the form of Hindi. Besides English, many other foreign languages also share their contributions to the development and prosperity of Hindi, which can be found if further research is to be carried out.

Regionalism of Culture of a Tropical Subcontinent

Being a result of the particular geographic environment and climate, regionalism is the unique characteristic of Indian culture, which some scholars tend to call the "culture of the tropical subcontinent". From a geographic point of view, the Indian subcontinent is just like an isolated island projecting into the Indian Ocean. The geographic separation and scorching weather are the main external factors contributing to the regionalism of Indian culture. Snow covers the Himalayas, the towering ‘world roof’, all year long and no one would set foot on the tops of these mountains in the winter . Oceans and seas surround India in the east, west and south. The only land which links it to the outside world in the east and west is also blocked by mountains, forests and deserts. People are terrified by the vast virgin forests permeated with noxious mist and miasma and the boundless deserts in which strong winds blow sands and stones day and night, so visitors have no courage to go beyond these limits. The Ganges and the Indus, mother rivers of India, bring benefits to the people, while they often cause serious flooding. Moreover, the tropical and subtropical climate also produces broiling weather and monsoon downpours.

The residents of Indian subcontinent felt insignificant and powerless in the face of the nature, so they held it in more reverence, thus giving birth to the thought that humanity and nature is identical. They imaged hazily that there was a dominating force in the heaven, earth and midair and that humans and everything on earth were nothing but its illusion. This dominating force was later on called ‘Brahman’. Gradually, the ideas about "the identity of Brahman-atman" and Self and self were fixed in their minds.

The scorching weather of Indian subcontinent often made Indian people unable to pursue their normal life and work, forcing them to go into the woods or gather under the trees so that they could unfold their endless imaginations about all the phenomena of the nature. As time passed, their imaginations had been enriched and their talents of expression had also grown. The abundance of food and availability of all sorts of tropical and subtropical fruits made it easy for Indian people to eat their fill. So the intellectuals and religious people among them had more time to probe into such questions as the nature of humans, the origin of cosmos, the delicate but concrete relationship between humans and nature or between humans and spiritual world,—all from their unique perspectives. Thus Indian culture has been marked by the characteristics of the culture of tropical subcontinent, and Indian people are famous for their imaginative thinking and eloquence. The works they created are charming, extending their philosophic thoughts aimlessly to rewrite the historical events and the real stories of the heroes in order to mix them with the rich and colorful myths of India. Great poems that are beautiful in rhythm had been compiled and spread wildly. As time passes, it’s hard for the later generations to tell the histories from the poems. Ramayana and Mahabharata, the two most famous epics of India, are among the greatest works of this culture of the tropical subcontinent. Both not only reflect the historical facts of India in that period, but also cover broad fields including philosophy, medicine, literature, carving, music, dance, astrology, geography and meteorology. The epics also spend a large portion of volumes touching upon statecraft such as politics, law, morality and traditions.

VALUES OF INDIAN CULTURE

In recent years, many scholars and experts engaging in studies of cultural values have emerged in China. As a result, quite a few dissertations and works analyzing the values of Chinese and Western cultures have been published. However, those dealing with Indian cultural values are less, not to mention those that expound Indian culture and its values systematically and comprehensively and conduct comparative research about them in international cultural research. So I want to explore this topic to the best of my knowledge in order to receive advice from experts and colleagues.

According to knowledge about cultural values, the patterns, factors and traits of specific values are determined in many aspects such as politics, morality, religion, nation, equality, justice, truth, goodness and beauty. However, they can still be generalized into three major aspects. As Tugalenov, a scholar of the former Soviet Union, put it in his book On the Values of Life and Culture, all the cultural values can be classified into three categories: material values, social and political values and spiritual values. In the following paragraphs, I will use these three criteria to advance my study of the values of Indian culture.

Material Values

The material value on which Indian culture puts emphasis is the perfect devotion/commitment of humans. Though enjoyment of material values is a part of Indian cultural values, it is only a part and cannot represent the ultimate goal the Indian cultural values pursue, that is, to realize the perfect devotion of humans. Most Indians brought up by the traditional Indian culture care less about the possession and enjoyment of material values: thus there exists a strong national mentality of helping those in distress and aiding those in peril. In India as well as in other countries, it’s not surprising to find that a rich person, even a very wealthy one, hands over his fortune for the good of social welfare. But the difference between India and others lies in the fact that Indian people see it as one way to fulfill their value objectives. It is no doubt that this mentality is linked to such religious thoughts as acquiring merit, doing good, good being rewarded with good and evil with evil. But we can’t deny the reality that Indian people pursue spiritual values much more than the material ones. Of course, there are Indians who collect wealth by unfair means or dissipate money without restraint. However most Indians pay little attention to clothing, food, shelter and means of travel and live a plain life. Even senior officials or wealthy people may not certainly seek the enjoyment of modern material life. A number of millionaires, presidents, premiers and ministers eat simple food; live in common houses wear native clothes and travel by homemade unrefined cars. This is not artificial, but is exactly the spiritual pursuit of Indian people. Most Indians don’t think much about possessing their properties after death because they don’t believe that man must take money and valuables with him in order to continue his enjoyment. Generally there are no luxuries and treasures buried with the dead after cremation, which is the reason why the majority of Indian cultural relics remain aboveground rather than underground. Another example is Mahatma Ghandi, the leader of the Indian independence movement and the founding father of India. During the Indian

struggle for national autonomy and liberation and against British colonial rule, he proposed that Indians weave native cloth themselves, wear native garments, and refuse to use foreign fabrics exported to India by the British. He also led several hundred thousand followers to evaporate brine to make salt. At first glance, it seems that everything Mahatma Ghandi did was just to resist the cruel suppression and rule of British colonists over the Indian people. The ultimate goal of Mahatma Ghandi, however, was the nonviolence as a means and a thinking, that is, he tried to awaken the conscience of the vicious British colonists by demonstrating the self-sacrifice of Indian people, to achieve independence and autonomy of India, and to make Indian and British people live in harmony. Through his whole life, Mahatma Ghandi cared little about personal gain and loss of material interests in his pursuit for material values. He led a strenuous and simple life. He lived just as common people, carrying nothing valuable with him. However, he believed in the law of cause and effect and sought release from the cycle of death and rebirth through realizing the oneness of Brahman-atman.

Social and Political Values

The social and political values of Indian culture are that humans should intend to create a harmonious environment, using the eternal law of the cosmos to normalize their own conducts in order to reach the ultimate stage of oneness with Brahman-atman. On the one hand, India attaches some importance to pragmatic interests and desires. On the other hand, more importantly, it spares no efforts to promote that everyone should persevere in his life and undertake the obligations of his family and his nation for the prosperity of the society and the wellbeing of his posterity rather than personal pursuits and gains. People must follow law and submit to it, complying with the social rules and morals prescribed by the eternal law, which is more than mere civil law and covers a whole range of meanings such as the task and justice of man, human relations and the social order. So the Indian traditional cultural values strongly emphasize that only by dedicating oneself selflessly to the society can his behaviors truly accord with the social and political values and can a harmonious environment be created.

The comprehensive survey of the historical development of the Indian society shows that its social and political values came into being through a strenuous course. In the era of the Upanishads, Indian religious philosophy considered that "karma" was the cause of the round of death and rebirth. So man had to suffer from the round and could not return to Brahman. The only way to eliminate the cause of "karma" was to quit working and stand aloof from worldly affairs. Therefore, it became more and more popular for Indians to sit in meditation and enter into religion in order to cultivate themselves according to religious doctrines.

This trend of thought developed even further and reached its peak with the rise of Buddhism. Buddhism taught people that life was no more than sufferings, the root of which is ‘karma". Man can’t escape from the round of death and rebirth because of "karma". It’s a dead circle that life follows death, and death is at life’s heel. Therefore, the only way to extricate one from the endless sufferings is to seclude oneself from working, family and society. The attitude of looking down upon fame and gain, power

and wealth, and tending to keep distance from the secular world became a big obstacle holding back the productivity of the Indian society and one of the factors eventually leading to the decline of Buddhism in India.

When Hinduism prospered in India, it began to amend the conception of "karma". According to its doctrines, those who dedicate themselves wholly to their work, abide by laws and social norms, and adhere to the eternal law to discipline their behaviors are considered to be free of "karma". Thus, Hinduism changed the utmost way of release from the round of death and rebirth from ‘standing aloof from the worldly affairs’ to ‘joining into the worldly affairs’. The principle of behavior of Hinduism stressed that man is always content with his lot and is able to control his feeling and get rid of insatiable desire. If he works whole-heartedly, he can set himself free from "karma". The social responsibility and dedication that Hinduism advocates reflects the identity of the social and political values of Indian culture and the nature, which are linked together by the same core contents as benevolence and kindness. Because only by love and benevolence, by loving people and by loving and kindly treating everything on earth can the political values be embodied perfectly? For this reason, Hinduism requires that people should speak, act and work in order to coexist with everything in nature rather than stress blindly on conquering it.

Spiritual Values

The ultimate goal that the spiritual values of Indian culture pursue is to realize the oneness of Brahman-atman, which is the only way for final salvation. India is a religious country. As early as the Vedic era, Indians had a strong belief that some kind of individual personality existed after death, which was considered to be the primitive soul of a human. This belief developed into the thought of heaven at the end of this era. It was said in Atharva Veda that the soul of the dead could reside in heaven, earth and midair, but heaven is the most ideal place. While it was believed in Rig Veda that those people eligible to enter the heaven were sadhus who conducted ascetic practices, soldiers who gave up their lives on the battlefield and devotees who didn’t hesitate to sacrifice their properties to Brahman could also enter heaven. Then the conception of ‘karma" began to emerge in Atharva Veda, which claimed that man must hold responsibility towards both the good karma and the evil karma on his own, and evil deeds must be punished accordingly. Based on this concept, the idea of the round of death and rebirth came into being. Evildoers must be punished, either being sent to the hell or being transmigrated into such humble things as pig, dog and muck, while those who did good would be rewarded by paradise. It was in the Upanishad era that such issues as the time limit of punishment and reward, soul and salvation were developed and clarified further.

The appearance of the Upanishads had a positive significance to a certain extent because the text was founded on the three major guiding principles of Brahmanism. It was the result of the efforts of some Brahmanic scholars who aspired to seek advanced thoughts to interpret the ultimate meanings of the ‘forest treatises’, part of the Vedas. These treatises included philosophic thoughts, so they were also called Vedanta philosophy. After it was finalized, the Vedanta philosophy claimed that the dominant in heaven, earth

and midair was Brahman. Though invisible and unrevealed as it was, it would appear in every place at any time. The material world and everything in it were just its illusion. Individual soul was essentially one with Brahman. This was the thinking of "the identity of Brahman-atman". Therefore, Hinduism sees the self-realization of the identity of Brahman-atman as the loftiest goal of reaching salvation. But because of "karma" man can't experience and recognize the atman. "Affected by Karma, the atman is unable to return to Brahman to identify with it after death. So man has to suffer from the round of death and rebirth or be reincarnated into a bird, a beast, a worm and a fish." For that matter, Indians consider life to be painful and that they must strive hard to find the way to reach salvation and the identity of Brahma-atman so that the suffering from the round of death and rebirth can be exempted, 'escaped from'. In order to achieve this goal, new paths had been put forward in the Bhagavad Gita, the classic work of Hinduism. They were the path of behavior, the path of devotion and the path of knowledge.

Path of Behavior**.** The believers must abide by the moral norms strictly, devoting themselves to the gods. Actions derive from freedom, so Hinduism encourages people to participate in all kinds of working practices, to love their jobs and to dedicate themselves to their jobs, which quite differ from the Buddhist way of salvation by quitting jobs to eliminate the cause of "karma". As put in the Bhagavad Gita, one who's every undertaking is devoid of the motivation of desires and their objects and who has incinerated all activities in the fire of pure knowledge,—he is the one the spiritually intelligent describe as educated. After giving up attachment to object-driven results, always satisfied, indifferent to external phenomena, he in spite of being engaged in activities does not 'do' anything at all. Bereft of desire, controlled in mind and body, relinquishing all conceptions of proprietorship whereby a person can incur sinful reaction, he performs only sufficient actions to maintain body sustenance.

The "spirit of self-forgetting aloofness of the Indian people", which people in today's India often talk about, is considered to be the ultimate truth they are pursuing, which requires that they exert their efforts to cultivate this spirit in order to work selflessly. This spirit also incarnates the correct values of India that the Indian President Kalam called upon the young people to 'inherit'. Kalam himself is the model practicing these values: he dedicates himself wholly to his work selflessly and remains indifferent to personal gains and losses in his pursuit for the causes of India are they missile projects or prosperity and strength. So his colleagues described him as a work maniac. For the sake of the missile programs, he pledged to remain a bachelor all his life and joked that he had already married missiles. This is the reason why he is called the "father of missiles" in India. In fact, it is Hinduism itself that has turned the way of release from the round of death and rebirth from aloofness to a joining into worldly affairs and promoting a spirit of 'involved detachment'. Therefore, the great Indian poet Tagore asserted this spirit promotes a 'stage of perfection' which is a combination of philosophic theory and practice. This is also the highest spiritual value modern Indians seek.

Path of Wisdom. Being a Hindu, he must seek truth in rationality and try to realize the identity of soul and Brahman through grasping the experience that "Brahman is atman". He must recognize that the identity of Brahman-atman is the absolute truth, since

only Brahman is the absolute existence while all other things are nothing but an illusion. Only through this understanding can he break up the limit of ignorance and eventually reach salvation. The Bhagavad Gita described the importance of the path of wisdom vividly. In the world there is nothing that exists as purifying as transcendental knowledge. One perfected by the science of uniting the individual consciousness with Ultimate Consciousness automatically attains that knowledge in the self in course of time. One with full faith, attentively focused, who has conquered the senses, achieves transcendental knowledge and having achieved transcendental knowledge attains supreme peace. Moreover, the Bhagavad Gita clarified further the importance of knowledge to the people who master it: It is directly related to reaching the highest state of the oneness of atman with Brahman.

The path of wisdom is very popular among Indians today. To most intellectuals, they feel subconsciously the urgency to master knowledge and open the door of wisdom not only for the sake of finding a favorable living and working condition, but also for approaching God and identifying with him.

Path of Devotion. If a Hindu loves a god and submits to him piously in the extreme, this is also a way of gaining the god's favor and reaching salvation. It is an effective way to identify with a god to cherish the god in heart, to do everything for god and to read the name of god silently every minute. For example, Mahatma Gandhi was so pious in his commitment to Rama that, after being shot down by a young Hindu fanatic, he kept murmuring the name of Rama as he used to, until his last moment. His last word, "hay, Rama", was carved on the black gravestone. His commitment to Rama also reflected the piety of Indian people at large. There was one passage spoken out by the god in the Bhagavad Gita, explaining this matter profoundly. "I am equally disposed to all living entitles; there is neither friend nor foe to Me; but those who with loving sentiments render devotional service unto Me, such persons are in Me and I am in them. Even if one committing the most abominable actions renders service only unto Me exclusively without deviation, one is to be considered saintly because one is correctly resolved and properly situated. One swiftly becomes endowed with righteousness and justly obtains everlasting peace. O Arjuna declare it boldly, My devotee never perishes."

'Nonviolent' Thinking in Indian Cultural Values

Nonviolence is the goal and state the Indian cultural values seek to achieve. According to Vedanta philosophy, everything in the world is self deriving from Self, so it should be friendly and equally disposed to others. Everything's true nature is divine and has the true, good and beautiful moral conduct, so people should be kind to and love each other. Moreover, the spirit of friendliness and love ought to be extended to beasts and birds, flowers and plants. Thus, killing is forbidden.

Within the ideological system of Mahatma Gandhi, nonviolent thinking derived from the tenets of Hinduism such as abstention from killing and restraint from harming others' feelings. Nonviolence is love, which means loving everyone and doing more good. He even considered asceticism as the criterion for love. For he always believed that everyone

is identical in nature and shares the same humanities as kindness and conscience. He advocated that the nonviolence seekers fully express their inner kindness through self-sacrifice and self-refinement in order to awaken the internal conscience of their enemies, so that they can give up evil and return to good.

The core of ‘nonviolent’ thinking of Mahatma Gandhi is "perseverance in truth". He believed that the truth was the ultimate reality and source of the cosmos and that everything in the world was no more than its external manifestations. He also presumed that the truth and the god are the law dominating every life in the cosmos. This view of Mahatma Gandhi emphasized that the human internal spirit originated from the same source as that of god, reflecting the divinity in human body. The Indian cultural values believe that people are identical with each other in spiritual nature because god is absolute and indivisible. It is this theory that drove Gandhi to stick to such doctrines as nonviolence and perseverance in truth in the national liberation movement. It needs to be pointed out that Gandhi’s thought belongs to historical idealism, which takes truth, goodness and beauty that are abstract and colored with mysticism as something eternal that goes beyond history and class and as the only way to handle human relations and solve social contradictions. But it also needs to be noted that India is a religious nation and people have strong beliefs in religions. Religion is so popular in India that religious thoughts have penetrated deeply into people’s minds and touched every corner of the society. Gandhi succeeded in creating a new ideology that collected the core values of Indian culture completely by combining his view of truth with the idea of nonviolence. Therefore, he was able to mobilize Indian people sufficiently to realize his thinking through arousing the spirit of self-devotion. And his thinking perfected the pursuit of Indian people for spiritual values, leading to the final victory of perseverance in truth and the movement of nonviolence and non-cooperation (with colonialism) and the founding of the Republic of Hindustan.

Although Gandhi’s ideas about nonviolence and non-collaboration and perseverance in truth were influenced by Western humanitarianism, it was the spiritual values of Indian culture Gandhi inherited that played the fundamental and decisive role. His theory combined traditional Indian philosophy closely with religion, ethics and social political theories. His idea was to build a Europe-type society with Indian religion, and adhering to the view of truth and epistemology derived from mystical Indian philosophy and basing its hopes on gods and the identity of humans with God.

Unit 3rd

DEFINITIONS OF PSYCHOLOGY

Psychology has been defined in different ways. Some people have defined psychology as an art. Other people have defined psychology as a science. Many text books define psychology as the science of mind and behavior. Psychology involves the study of human nature and/or behavior. Different opinions come from different perspectives.

Importance of psychology

Positive thinking is very important in our life and psychology gives us the positive thinking. Psychology is applied to change the life.

Relationship between Sociology and Psychology

Sociology and Psychology are closely related with each other. Both are interrelated and inter-dependent. Psychology is concerned with the exploration of the depth of man's mind and behavior in society. It is said that psychology shows the significance of the relationship between the organism (individual) and environment and the response of the former to the latter. It is defined as "the study of man's mental life and behavior". It is the science of mind of mental processes.

The aim of psychology is to arrive at the laws of mental life and behavior of human beings. Sociology, on the other hand is the study of society. It studies man's social relationships. In the words of Thou less, psychology is the positive science of human experience and behavior.

Thus, sociology studies society where as psychology is concerned with human behavior, So there are resemblances between psychology and sociology. Both are regarded as positive science. These two disciplines have a great deal in common and are inter-related. It is difficult to understand the inter-relations and the activities of human beings; without an adequate knowledge of human psychology. In the same way, many truths of psychology would remain unintelligible without a comprehensive idea about social relationships, behavior and activities.

There is no gain saying the fact that psychology trends support to sociology and the help sociology extends to psychology, is by no means insignificant. In other words they depend on each other for their existence. In this way, both psychology and sociology are deeply related to each other.

Relationship between Anthropology and Psychology

Psychology is the science of human behavior. Even anthropology encompasses in its scope the understanding and analysis of human behavior. Both anthropology and psychology are closely related. Psychology studies man's behavior in relation to the environment. Anthropology is also a comparative and analytic study of human behavior and experiences. Both try to understand man in the context of social behavior. In this way psychology arid anthropology are complementary to each other. Whereas on one side psychological knowledge helps an anthropologist in understanding the root causes of human behavior in different cultures, on the other side anthropological studies help the psychologist in calculating the influence of cultural environment of human behavior.

In the modern times, the various anthropological studies have rendered important help in the field of psychology. By studying different primitive cultures, anthropologists have

shown how human behavior differs in different cultural environments. Every culture has its special method of social control, which has an important influence on the personality of its members. For example, there has been a great disturbance in the adjustment of adolescence due to restraint on the mutual relations among the individuals of different sexes in civilized societies. It has been found through anthropological studies that such changes are nowhere to be seen in many primitive societies. For example, as in civilized societies, there is no restriction of any kind among the natives of. Samoa Island and therefore an adult become self-reliant very early. In India, as compared to Hindu society, it is easier for adolescents of tribal society to become adults due to increased sex education and decreased restrictions. In this way, psychologists learn from such studies the changes that can be seen in human personality and behavior as a result of cultural changes.

The closest relationship between psychology and anthropology is seen between the main branches, social psychology and cultural anthropology. Social psychology studies the individual behavior under social environments. Social anthropology also studies human society, social institutions and groups. Explaining their relationship, Hoebel writes The anthropologist concentrates chiefly on the society of the primitive people and the sociologist concentrates on our contemporary civilization. The social psychologist roams happily between them manipulating his tests and measurements.

In spite of their close relation, the difference between anthropology and psychology should not be neglected. In brief, the chief differences between them are as follows.

1. Psychology studies individual behavior in social environments whereas anthropology studies not an individual but the whole of the mankind.
2. Psychology studies individual behavior in social environments whereas social anthropology studies groups of individuals.
3. Both psychology and anthropology study man but with different viewpoints.
4. Whereas some methods of observation are commonly employed in both of these sciences, some methods of psychology, like the introspection method, are not used in anthropology.

Both psychology and anthropology, however, can contribute enormously to our understanding of man.

Relationship between philosophy

Another way of defining the relationship between philosophy and psychology is that between truth and need.

Psychology works with need.
Philosophy works with truth.

As an example, consider political theory. A psychological approach can determine the needs of the various strata of a society. Then a philosophical theory can be constructed

which takes into account these needs. Usually, however, a political thinker centres his theory at his own social level.

Historically in Western Philosophy, Psychology was part of philosophy until the 19th century when it became a separate science.

Is Psychology a sibling of Philosophy? Surely in the past they were close siblings, members of the same family. After the 19th century the relationship becomes more problematic.
In the 17th and 18th centuries, many Western philosophers did pioneering work in areas that later came to be known as "psychology." Eventually psychological inquiry and research became separate sciences, the study and research into the mind. In short, psychology became identified as the science of mind insofar as its function is to analyze and explain mental processes: our thoughts, experiences, sensations, feelings, perceptions, imaginations, creativity, dreams and so on. It is mostly an empirical and experimental science; although the field of psychology does include the more theoretical Freudian psychology and the more speculative Jungian psychology.

But philosophical work was not always distinct, and even today is not wholly distinct, from psychological considerations. It may be that some forms of philosophy can never break away completely from psychological issues.

Baruch Spinoza's great work, Ethics, includes many observations and insights about our reasoning processes and emotions. The early emphasis on epistemological questions by such thinkers as Rene Descartes, John Locke, David Hume, and Immanuel Kant includes much observations and statements about mental processes connected with knowing and belief; but in these writings there tends to be a mixing of psychological statements (process of knowing) with conceptual philosophy.

In our critiques of these works in epistemology we try to separate the philosophical theme (logic, conceptual and propositional evaluation) from the psychological aspect (causes of belief, mental process underlying perception). But in large part the problem remains, especially in such areas of philosophy of mind, of keeping philosophical work **free of psychology altogether.**

Human behavior

The capacity of mental, physical, emotional, and social activities experienced during the five stages of a human being's life - prenatal, infancy, childhood, adolescence, and adulthood. Includes the behaviors as dictated by culture, society, values, morals, ethics, and genetics.

UNIT 4th

Timber extraction

Forests are valuable resources. They provide raw materials for industries, timber for buildings, furniture's and many other uses. The forest ecosystem is dominated by various species of trees.

The chief product that forests supply is wood like timbers. Major forest products consist of timber small wood and fuel wood. Indian forests produce about 5,000 species of wood, of which about 450 are commercially valuable. Hard woods include important species such as teak, ironwood, mahogany etc. These woods are used for constructional purposes. Population explosion had its tremendous pressure on demand for timber and other wood. Consumption of wood for industrial uses is more in developed countries than the developing countries. India has abundant timber. It accounts half of the total biomass produced by a forest. But demands may become still higher in future.

That increase in demand cannot be met from what we produce at present. Total requirement of timber in the year 2000 was 46.755 m^3 (based on DCPPT, 1983). It is a matter of serious concern that the present generation man has forgotten the value of forests. The reckless felling of trees from the very beginning of the present century without caring for environment

Timber extraction is a significant cause of deforestation in Central Africa and South-eastern Asia. The biggest problem of the Indian forests is the inadequate forest cover. Forests cover only 23.13 per cent of the area against the required coverage of 33 per cent.

Major causes responsible for timber famine in Europe in 16th and 17th centuries prevail in these forests too. It will be worthwhile to consider the possibility of converting a large portion of the crippled worthless forested area to agricultural land for production of grasses or other fodder crops suitable for existing soils.

You May Also Like:

MINING

Mining is the foundation of industrial civilization. It is the process of extracting minerals like gold, silver, copper, nickel and uranium (metallic) and salt, potash, coal and oil (nonmetallic) formations that concentrate naturally in the earth.

It may surprise you, but other than agricultural products, the raw ingredients for everything else in our modern lives comes from mining; from the minerals in your toothpaste to the plastic case and gold circuits in your computer, to the metal frame of your automobile and even the road itself, to the salt on your dinner table and the silver chain around your neck.

Mining Engineers design and operate mines. Mining Engineering is one part technical design and one part business management. Mining engineers are responsible for deciding how valuable a mineral deposit is and how best to mine it, for planning the day-to-day schedule and path of mining to maximize extraction and profit, and for ensuring the safety of people and equipment through mine ventilation and rock mechanics.

As with other engineers, a thorough understanding of fundamental mathematics and sciences are required. However, mining engineers also require an understanding of a number of aspects of other engineering disciplines including Civil, Electrical, Geological, Mechanical and Computer engineering. Unlike other engineers, Mining Engineers have the added challenge of working in rock from thousands of meters above and below sea level.

Dams and their effects on forest and tribal people

The loss of forest and productive land cannot be ignored. It is calculated that between 1951 and 1976 big river valley projects have swallowed half a million hectares of forestland and nearly one-tenth of the area which has benefited from irrigation.

The Keno river project in Nigeria has revealed major adverse environmental effects. Wide destruction of forests has reduced the availability of fuel and other minor forest produce to the poor.

This increased the misery women in fuel collection.

The destruction of economic trees reduced income from beer brewing and deprived women of income from collection of fuel wood. In champ ally and Bhopal, pattern dams on the borders of Maharashtra, Madhya Pradesh and Andhra Pradesh are expected to inundate 40,000 hectares of rich deciduous forests.

Besides fuel wood, these forests provide valuable minor forests products like Mahua, Chironji (a dry fruit), Tendu leaves (used for beedi production) and some other forest product, and tubers and roots, which are nutritionally very rich. Poor tribals and other villagers are deprived of these products.

It is estimated that about 45,000 hectares of forestland will be submerged in the Narmada Valley project. These are mainly teak and Sal forests, which have a very high economic value. Besides the forests, which will go under submergence, another 1260 hectares of forestland will be required for construction of workers' quarters and approach roads. Another problem is that the forests, which will remain in the command area, will come under tremendous pressure, and the people of the surrounding area and their livestock will over utilize them.

Irrigation engineers claim that dams submerge forests; they are able to plant new forests along the canals and dam sites. It is important to note that it takes many years to grow forests. Some of the species are difficult to grow.

It can be argued that fast growing species can be grown, but they cannot be substitutes of old natural forests, which have developed through hundreds of years. Again fast growing species may not be as strong as old trees. So the destruction of forests is one of the worse effects of large dams. Valuable forest resources are destroyed in favors of new resources of irrigation.

Water resources - Resources of water

Water resources are defined as the sources by which we can get the water for our different types of uses and also those sources that gives the huge benefit to the life of the humans is referred to as the water resources. The water that is used in the production of different types of useful products also included in the water resources. Or we can also say that the availability of the water to get rid of the demand of the water is called as water resources. Basically the function of the water resources is that to overcome the desires or the requirement of the water for the agricultural or household purposes.

Types of Water Resources:
The water resources are divided into different categories on the because of their composition and also on the basis of their uses for the benefit of the humanity. Some important types of water resources that are used to provide the useful sources of water are as follows

Saltwater Resources:
Saltwater resources are the types of water resources tat can make the saltwater for the sake of the benefit of the mankind and also save the environment from harm. As we know that there is abundance of the saltwater in the whole World. But the saltwater resources when come contact with the regular supplies, it lost its useful properties. Saltwater resources are also useful ion generating the hydroelectric energy. But the tidal water is essential for the generation.

Surface Water Resources:
Another type of the water resources is the surface water resource. It is that type of water resources in which the water present in the rivers or in the streams plays an important role in maintaining different types of technologies and also used to upgrade the productivity. Basically this type of water is used in many useful purposes such as for the industrial use, for agricultural use and for the generation of different types of energy i.e. hydro electrical energy. Surface water is very important because its 98% is used in the industry for manufacturing of different products.

Ground Water Resources:
It is that type of water resource that is comprised on the different types of water resources that are fresh in nature. Because of its high usefulness people use groundwater to increase the growth rate of the plants. The ground water that moves into the ground makes the soil fertile and increases its productivity. Ground water divided into two zones i.e. saturated and unsaturated and these zones are separated with the help of water table below the ground.

Factors Affecting the Water resources:
There are lots of factors that affect the properties of the water resources and some time enhance or decrease the property of them. Some important factors that play an important

role in the water resources are given below

Climate:
Different types of factors related to the climate affect the water resources. For example the water distribution during the rainfall plays an important role and time period of falling also matters. Snow factor also affect the water resources because some times the water become ice. Some factors related to the plants are also affecting the water resources such as the process of evaporation and the property of the plant to transpire.

Physiographic Factors:
These are the other types of factors that affect the water resources; basically it is the combination of two factors i.e. physical and the geometric factors. in the physical factors we deals the type of land used for the cultivation, types of soil and many other related factors. But in the geometric factors we discussed about the shape and the area and also the drainage property etc.

What is groundwater?

When rain falls to the ground, the water does not stop moving. Some of it flows along the surface to streams or lakes, some of it is used by plants, some evaporates and returns to the atmosphere, and some sinks into the ground. Imagine pouring a glass of water onto a pile of sand. Where does the water go? The water moves into the spaces between the particles of sand.

Groundwater is water that is found underground in the cracks and spaces in soil, sand and rock. Groundwater is stored in--and moves slowly through--layers of soil, sand and rocks called aquifers. Aquifers typically consist of gravel, sand, sandstone, or fractured rock, like limestone. These materials are permeable because they have large connected spaces that allow water to flow through. The speed at which groundwater flows depends on the size of the spaces in the soil or rock and how well the spaces are connected.

The area where water fills the aquifer is called the saturated zone (or saturation zone). The top of this zone is called the water table. The water table may be located only a foot below the ground’s surface or it can sit hundreds of feet down.

Groundwater can be found almost everywhere. The water table may be deep or shallow; and may rise or fall depending on many factors. Heavy rains or melting snow may cause the water table to rise, or heavy pumping of groundwater supplies may cause the water table to fall.

Water in aquifers is brought to the surface naturally through a **spring** or can be **discharged** into lakes and streams. Groundwater can also be extracted through a **well** drilled into the aquifer. A well is a pipe in the ground that fills with groundwater. This water can be brought to the surface by a pump. Shallow wells may go dry if the water

table falls below the bottom of the well. Some wells, called **artesian wells**, do not need a pump because of natural pressures that force the water up and out of the well.

Groundwater supplies are replenished, or **recharged,** by rain and snow melt. In some areas of the world, people face serious water shortages because groundwater is used faster than it is naturally replenished. In other areas groundwater is polluted by human activities.

In areas where material above the aquifer is permeable, pollutants can readily sink into groundwater supplies. Groundwater can be polluted by landfills, septic tanks, leaky underground gas tanks, and from overuse of fertilizers and pesticides. If groundwater becomes **polluted**, it will no longer be safe to drink.

Groundwater is used for drinking water by more than 50 percent of the people in the United States, including almost everyone who lives in rural areas. The largest use for groundwater is to irrigate crops.

It is important for all of us to learn to protect our groundwater because of its importance as a source of water for drinking and irrigation.

Source Water Protection is a process that enables citizens to protect local groundwater supplies which serve as a source for drinking water. The Groundwater Foundation offers a workshop and guide to assist communities in their Source Water Assessment and Protection efforts. In addition, The Groundwater Foundation can help raise awareness in your community through the Groundwater Guardian program.

Want to share basic groundwater information with your community? Informative Groundwater Basics brochures are available for purchase

Overuse and misuse

The ways in which freshwater resources are used, particularly for agriculture, leave much to be desired. In some places, these resources are overused in the sense that use exceeds renewable supply rates, and so cannot be indefinitely continued; elsewhere, wasteful overuse in one area deprives users in other areas, leading to falls in agricultural production and loss of jobs. Misuse occurs where clean water is abstracted and returned to the water system in an unusable state.

Abandoned boat on the dried-up sea floor of the Aral Sea.

The Aral Sea is one of the planet's greatest environmental disasters. Prior to 1960 an average of 55000 million m3 of water flowed into the Aral Sea.

Withdrawal for cotton irrigation and the construction of flood storage reservoirs resulted in a decline in average annual inflow to 7000 million m3 between 1981 and 1990. As a result, the sea level fell by 16 meters between 1962 and 1994 and the lake volume was reduced by three-quarters. Twenty of the 24 species of fish that used to be present in the sea have disappeared, and the fish catch that totaled 44000 tons a year in the 1950s and supported 60000 jobs has dropped to zero. Toxic dust-salt mixtures picked up from the dry seabed and deposited on surrounding farmland are harming and killing crops. The low river flows have concentrated salts and toxic chemicals, making water resources hazardous to drink and contributing to the high rate of many diseases in the area. Those who remain in the area have lost their main livelihood. Those who have left have become environmental refugees.

Used irrigation water is often contaminated with salts, pesticides and herbicides. Industry and urban centers also return contaminated water to both surface and underground water resources.

One of the most conspicuous results of overuse is that some large rivers - including the Haunches, the Colorado and the Shebelle - now dry up before reaching the sea. The Amu Darya River which feeds the Aral Sea (see box left) has been deprived of its entire water reserves for irrigating cotton plantations. The Yellow River in China did not complete its descent to the sea for a total of seven months during.

Dried-up rivers are a good example of the overuse of freshwater resources. Overuse in one place means deprivation in another. The flat fertile deltas of many rivers were once centers of high agricultural production. Where the rivers no longer flow, water for irrigation becomes unavailable, farmers go out of business and local production fails.

The causes are usually upstream development. Logging, road building and upstream agriculture often increase soil erosion, resulting in increased sedimentation. This leads to

flooding in mid-stream areas and reduced water flows downstream. Sedimentation is also clogging the world's major water reservoirs, currently estimated to hold about 6000 km3 of water. About one percent of this - the equivalent of 60 km3 - is now being lost annually through sedimentation.

Irrigated agriculture has a significant impact on the environment. One positive impact is that high-productivity irrigation of a small area can often replace the use of a much larger area of marginal land for growing crops. However, abstraction of irrigation water from rivers and lakes can also jeopardize aquatic ecosystems such as wetlands, leading to losses in their productivity and biodiversity. This has important implications for human populations that once depended on the major inland fisheries that such areas previously supported and on the natural filtering action of wetlands which have historically been responsible for cleaning up much of the world's wastewater. Where wetlands have been eliminated in the name of irrigation, the results have usually been regretted.

The agricultural chemicals used in irrigated farming often contaminate surface runoff and groundwater. Potassium and nitrogen from fertilizer applications on both rainfed and irrigated land may be washed into groundwater or surface water where they can lead to algal blooms and eu trophication.

Poplars being irrigated with raw sewage water in India.

Irrigation can also concentrate naturally-occurring salts in the water, which then accompany return flows to groundwater or to surface streams and rivers. Irrigation in arid regions can also leach naturally-occurring toxic elements such as selenium from soils and into surface water and groundwater. Overirrigation can lead to water logging which reduces yields substantially.

All these problems are amplified as water use intensifies. Furthermore, unconventional water sources have to be tapped as conventional supplies dry up: brackish water and sewage effluents may have to be used for irrigation, and risks to human health may result if not managed properly.

Many countries are already using more water than their renewable supply, and are in a water-deficit situation. Water deficits are created mainly by exploiting groundwater faster than it is replenished. This is in effect the mining of a natural resource, and some arid countries rely substantially on such mined resources, particularly for irrigation (see table). This is a non-sustainable use of resources which cannot be continued far into the future.

The overuse of groundwater as a resource for food production has serious implications. Aquifers have been overexploited in many countries. Estimates of annual depletion in the major water-deficit countries add up to about 160 km3. This suggests that about 180 million tons of grain, or some 10 percent of the global harvest, are being produced by depleting water resources. Ironically, an equal or greater amount of food production is under threat from rising groundwater tables in places where irrigation is used but drainage is inadequate.

Overuse of limited water resources is exacerbated by waste, which occurs at almost every point at which humans interfere with the natural water cycle. Irrigation is notoriously wasteful: water is wasted at almost every point in the cycle, from the leaking canals that are used to supply irrigation water to the huge volumes of water that fall uselessly on soil where there are no crops or which are in excess of the uptake required by the crop. Improving irrigation efficiency - currently less than 40 percent - is a key goal for the future.

Groundwater mining in selected countries

Country	mining as % of total water withdrawal
Kuwait	46.5
Bahrein	40.2
Malta	32.2
United Arab Emirates	70.9
Qatar	14.9
Libyan Arab Jamahiriya	90.0
Jordan	17.5
Saudi Arabia	79.7

Source: Water Resources of the Near East Region: a review

(FAO, Rome, 1997)

What are the causes of flood?

Natural Causes of Floods:

1.High rainfall

Heavy rainfall raises the water level. When the water level is higher than the river bank or the dams, the water comes out from the river, there will be flooding.

2. Snowmelt

Because of global warming, the temperature of this year is higher than the temperature of many years ago. The ice caps melt in spring, and the water goes into the sea. The water raises the sea level, and makes the river level rise. When river level rises, flooding may occur.

3. Relief

Flooding often occurs in lowlands. This is because rivers flow more slowly in low-lying areas. If the water volume increases suddenly, floods occur.

4. Coastal flooding

Flooding always occurs in coastal areas. High tides or storms cause the water level to rise. If the water level is higher than the level of the coastal lowland, flooding will occur.

Human Causes of Floods

1.Deforestation

large areas of forests near the rivers have been cleared. The lands are used to make room for settlement, roads and farmland. Less vegetation protects the soil, the soil is quickly lost to rivers and the sea. This raises the river bed, so the river overflows its banks easily.

2. Poor farming

some farming practices can damage the vegetation cover, so the soil will be washed into the river easily.

Overgrazing
People want more food and money. They graze too many animals on the land and the pasture is eaten away quickly. Less vegetation cover results in soil washed into the rivers easily.

Over cultivation
when a piece of land has been used for farming for a long period of time, the soil may become so infertile that no vegetation can grow on it. The land is less fertile than before so the soil washed into the rivers more easily

3.Poor water management

when the dams are poorly constructed or maintained, they can easily collapse and this results in flooding. In China, many lakes along the major rivers have been heavily silted and reclaimed,

4.Population pressure

Because of large amounts of people, everything needs more, like wood, land and food……
Soil erosion happens more often and increases the risk of flooding.
Large numbers of people live in areas with high risk of flooding in China. They cause the problems of overgrazing and over cultivation.

Drought

Drought is a period or condition of unusually dry weather within a geographic area where rainfall is normally present. During a drought there is a lack of precipitation. Droughts occur in all climatic zones. However, its characteristics vary significantly from one region to another.

Drought usually results in a water shortage that seriously interferes with human activity. Water-supply reservoirs empty, wells dry up, and crop damage ensues. Its seriousness depends on the degree of the water shortage, size of area affected, and the duration and warmth of the dry period. In many underdeveloped countries, such as India, people place a great demand on water supply. During a drought period there is a lack of water, and thus many of the poor die.

Most precipitation depends on water vapor carried by winds from an ocean or other source of moisture. If these moisture-carrying winds are replaced by winds from a dry region, or if they are modified by downward motion, as in the center of an anticyclone,

the weather is abnormally dry and often persistently cloudless. If the drought period is short, it is known as a dry spell. A dry spell is usually more than 14 days without precipitation, whereas a severe drought may last for years.

Statistics indicate that every 22 years a major drought occurs in the United States, most seriously affecting the Midwestern states. The drought of 1933-35, during which large areas of the Great Plains became known as the Dust Bowl, is an example of a disastrous drought that took place in the United Sates. The effect of the drought was brought about by over cropping, overpopulation, and lack of relief measures.

Although drought cannot be reliably predicted, certain precautions can be taken in drought-risk areas. These include construction of reservoirs to hold emergency water supplies, education to avoid over cropping and overgrazing, and programs to limit settlement in drought-prone areas. The Southern Africa Development Community monitors the crop and food situation in the region and alerts the people during periods of crisis.

Dams –benefits and problems

Looking at the adverse effects of large dams, the question arises that should the construction of big dams be stopped? The discussion on the negative impacts of irrigation through large dams does not lead to conclusion that dams are always harmful, but they need to be planned properly.

It is true that dams have some undesirable effects, but these constraints may be minimized through careful designs. There should be a balance between large, medium and small dams. The exclusive construction of large dams renders the environment imbalanced and proves more harmful than profitable.

Instead of one large dam, a series of small dams can be built. So a huge water body at one place does not prove harmful to the people of the area. Along with the construction of small dams, a forestation can be undertaken.

The forest will store water underground through the roots of trees and nourish agriculture too. In order to have balanced development between people and the environment, it is better to do planning of the irrigation system at the micro-level instead of the micro-level, which is difficult to manage.

Mineral Resources

These are the natural resources which cannot be renewed. They are present in the organisms as an organic and inorganic molecule and ions. The calcium, phosphorous, sodium, chlorine and sculpture are the major minerals in the animals. The minor minerals in the animals are iron, copper, cobalt, zinc, fluorine and selenium. The minerals in the plants are divided into the macro and micro nutrients. The macro nutrients consist of

calcium, magnesium, sculpture and iron. The micro nutrients consist of manganese, cobalt, zinc and chlorine. The minerals are present everywhere in the world. Their distribution varies from one country to the other. They are non equal in the distribution. India is rich in coal, manganese, iron, chromites and mica. It is deficient in the gold, silver, nickel etc. In the North America there is an abundance of molybdenum but it is deficient in the tin, manganese. However these deficient metals are found in abundance in the Indonesia and Malaysia. The gold and uranium occurs in good abundance at the South Africa but it has a deficiency of silver and iron. The most common fertilizers in India are the NPK. India depends on the other countries for its supply. Our country is in deficiency of the petroleum and electrical energy. The raw material is also deficient. New projects are undertaken to explore the new opportunities of energy. If we move at the present rate most of the important metals will last only in this century. However, some of them like manganese, aluminum, cobalt, iron and chromium can work till 2500 A.D. The minerals must be conserved and should be recycled regularly. They must be used as a raw material where there is a major need. They must be explored regularly. They must be substituted and new techniques must be used to prevent its loss.

a monument of the exploitation.

It is the very act of abandonment that will only aid a continual degrading of the land through natural forms of erosion and more. Minerals and Their Uses

Every segment of society uses minerals and mineral resources everyday. The roads we ride or drive on and the buildings we live learn and work in all contain minerals. Below is a selected list of commonly used metallic and nonmetallic minerals, ore minerals, mineral byproducts, aggregates, and rock types that are used to make products we use in our daily life.

Aluminum

Aluminum is the most abundant metallic element in the Earth's crust. Bauxite ore is the main source of aluminum. Aluminum is used in automobiles and airplanes (36%), bottling and canning industries (25%), building and electrical (14%) and in other applications (25%)

Basalt

Basalt is an extrusive igneous rock. Crushed basalt is used for railroad ballast, aggregate in highway construction, and is a major component of asphalt.

Calcium

The primary use of calcium is not in its silvery-white metal form, but as calcium carbonate. It used in adhesives and sealants, cosmetics, foods, paint, paper, pharmaceuticals, plastics, rubber, for the production of lime, and as crushed stone in construction. Immense quantities of calcium are found in sedimentary rock deposits of gypsum, limestone, and shale. Some common calcium-bearing minerals include apatite (calcium phosphate), calcite (calcium carbonate), dolomite (calcium magnesium carbonate), fluorite (calcium fluoride), and gypsum (calcium sulfate). Calcium metal is produced in Canada, China, France, Russia, and the United States. Total world output is thought to be less than 6,000 metric

tons per year. United States consumption of calcium metal is small. On a worldwide basis, more than 100 million metric tons per year of apatite and gypsum are mined, and calcite and dolomite are produced in billions of metric tons per year.

Cement

Cement is used for building materials, stucco, and mortar. Cement is :a mixture of powdered lime, clay, and other minerals that crystallize to form a hard solid when water is added (hydraulic cement) or as a binding material in concrete" (Kessler, 1994). An excellent overview of cement, its chemistry, and properties can be found in MacLaren and White (2003).

Clays

There are many different clay minerals that are used for industrial applications. Clays are used in the manufacturing of paper, refractories, rubber, ball clay, dinnerware and pottery, floor and wall tile, sanitary wear, fire clay, firebricks, foundry sands, drilling mud, iron-ore pelletizing, absorbent and filtering materials, construction materials, and cosmetics.

Copper

Copper is used in electric cables and wires, switches, plumbing; heating, electrical, and roofing materials; electronic components; industrial machinery and equipment; transportation; consumer and general products; coins; and jewelry.

Diamond

Industrial diamonds are those that can not be used as gems. Large diamonds are used in tools and drilling bits to cut rock and small stone. Small diamonds, also known as dust or grit, are used for cutting and polishing stone and ceramic products.

Gold

Gold is used in dentistry and medicine, jewelry and arts, medallions and coins, and in ingots. It is also used for scientific and electronic instruments, computer circuitry, as an electrolyte in the electroplating industry, and in many applications for the aerospace industry.

Potash

Potash is an industry term that refers to a group of water-soluble salts containing the element potassium, as well as to ores containing these salts (Kesler, 1994). Potash is used in fertilizer, medicine, the chemical industry, and to produce decorative color effects on brass, bronze, and nickel.

The exploitation of mineral resources and their affects on the earth

There is little doubt that the extraction of various mineral resources from the Earth is a necessary endeavor. The resources pulled from mining operations goes into everything from technology to foods, and new uses are found by the day. The problem isn't just their removal from the ground, but the methods and aftermaths of the process of extraction.

Mainly due to outdated policies and laws such as the General Mining Law of 1872, even federal lands are exploited by anyone without even requiring royalties or site clean-up requirements. This favoring of hard mineral extraction makes virtually all non-privately owned land fair game to vigorous mining activities in the States, and there are likely similar loose standards across the globe.

Furthermore, the practices of the mining operations are generally set up without care for the indigenous wildlife species or the well-being of popular natural splendor.

All across the world, mining takes many forms, burrowing into the Earth via tunnels, or a removal of surface layers of dirt and soil that has no merit other than being in the way. This non-profitable extraction is just as easily tossed aside without care for surrounding lands, which can lead to habitat destruction and an introduction of unhealthy sediment levels in nearby water ways.

The introduction of foreign particulates and other forms of matter in the local water systems can have adverse health affects on the aquatic life and even animal and people that many drink it later on. Whether this is due to increases or decreases in ph levels or general chemical imbalance, it depends.

In addition to just on-site disregard to environment, the systems of roads and trails that connect to the operation introduce many more forms of destruction. Transportation for the raw ores and minerals must be arranged to separate the useful from the waste, and more times than not, these facilities will not be located on location, which means that major construction is necessary to remove the materials.

As for extraction facilities, power relays, and the movement of the necessary tools into a site, the land will be forced to undergo a transformation into something that has no resemblance to its former self. While more manmade pollutants will leach into the land from point and non-point sources alike, destroying the surrounding region little by little.

When all is said and done, and a mining location has outlived its usefulness, it isn't unheard of for the site to just be abandoned as is, without anything else done. This means that whatever scars were carved into the land will stay, and that the abandoned facilities and discarded mining operations will forever remain as

Food resource

Human body needs food for various purposes. Food consumed by humans are of different types and a balanced diet is needed for all practical purposes, vitamins, proteins carbohydrates and minerals are primarily obtained from cereals, fruits, vegetables, pulses and spices, milk, butter, meat and eggs all of which obtained from different types of plants and animals. These are our main food resource. A large number of items are consumed by human either in their natural states or after proper processing and cooking.

The food consumed by human is influenced by wide range of cultural and individual differences, mainly due to ecological as well as personal reasons. The source of much of the food consumed by man is terrestrial agricultural, which represents the most manipulated of all the non-urban ecosystems. There are two main types of agriculture (1) Crop agriculture in which plant production is harvested for use by man and (2) Animal agricultural where a crop from highly manipulated ecosystem is fed to domesticated animals.

Food consumption pattern is different in different regions. The most important feature is that rice to the staple food for most Asians. In general a strong and healthy human consumes about 1.4 kg of food every day. Such a food serves as a source of energy and replacement of uses.

However, the excessive use of potential chemicals is being used at various stages of cultivation. By doing so, the food products are contaminated. The persistent pesticides are considered to be damaging and toxic. As a result of such a practice human population has to face a great problem so for as sources of food are concerned. Although by undergoing several good practices before cooking or consuming the food products it has been observed several kinds of diseases affect the health.

In addition to pesticide problems, several heavy metals or their compounds have also led to serve toxicity problems and most of them have provide pathways for several fatal diseases, some examples of such an effect are cereals, spinach are the major sources of cadmium, fruits and vegetables account for 80% of lead intake, meat, fish, poultry and cereals constitute major sources of selenium and the dietary intake of mercury arises from the consumption of fish: when food sources supply heavy metals at levels higher than their daily tolerance limit, constituting, they cause a source of health disorders.

New Sources of Food:

It has been conduced that even if the rapid development of conventional agriculture is sustained protein deficiency will continue to exist. Accordingly a search is in progress for supplementary sources of plant and animal proteins. Amongst these animal protein has been considered to be of more importance because of the similar amino acid composition of man. Besides, animal's flesh has the advantage that it more easily assailable. In case the animals are to be avoided, a food source which will yield plant protein in a digestible form or from which the majority of cellulose has been removed, fungi can be preferred.

These can be easily assimilated and contains a good amount of protein. Other sources are fish and beef. The advantage of using mushroom is that it does not absorb much human or fossil energy in production can be grown independently of environment factors.

Young seabirds, reptiles, amphibians, insects, mollusks, rodents and many other animals can be utilized as food. Fresh water and brackish water fish are other sources of animal proteins. It has been found that marine and fresh water fisheries provide best sources of animal protein.

CAUSES OF THE WORLD FOOD PROBLEM

Source: Adapted from C.G. Knight and R.P Wilcox, Triumph of Triage? The World Food

Problem in Geographical Perspective, resource paper no. 75-3 (Washington, D.C.: Association

Of American Geographers, 1976), p.4. Note: although this information is from 1976, if you

Consult more recent materials, you'll find the list has not changed.

(This information can be used when working with the WEB CHART - Option #2.) World Wide Problems

Natural catastrophes___drought, heavy rain and flooding, crop failures.

2. Environmental degradation.

3. Food supply-and-demand imbalances.

4. Inadequate food reserves.

5. Warfare and civil disturbances.

6. Migration refugees.

7. Culturally-based food prejudices.

8. Declining ecological conditions in agricultural regions.

Problems of the Developing World

1. Underdevelopment.

2. Excessive population growth.

3. Lack of economic incentives farmers using inappropriate methods and laboring on land

They may lose or can never hope to own.

4. Parents lacking knowledge of basic nutrition for their children.

5. Insufficient government attention to the rural sector.

Problems of the Industrialized World

1. Excessive use of natural resources.

2. Pollution.

3. Inefficient, animal-protein diets.

4. Inadequate research in science and technology.

5. Excessive government bureaucracy.

6. Loss of farmland to competing uses.

Problems Linking Industrial and Developing Worlds

1. Unequal access to resources.

2. Inadequate transfer of research and technology.

3. Lack of development planning.

4. Insufficient food aid.

5. Politics of food aid and nutrition education.

7. Inappropriate technological research.

8. Inappropriate role of multinational corporations.

9. Insufficient emphasis on agricultural development for self-sufficiency.

WATER LOGGING AND SALINITY

Water logging, salinity, and non-agricultural uses are squeezing Pakistan's precious arable lands and posing serious threat to the agriculture sector and nation's foodsecurity.They estimate that everyday approximately 500 acres (1 acre = 4,840 square yards) of farmland is taken out of agriculture by the expansion of settlements, roads,factories and many other non-agricultural activities in the country WateThey predict that if this trend continues then after every decade approximately amillion acre or more of crop land would be taken out of agriculture in our country whichis far more than other countries of the region.They say that arable land is a basic and major resource for the production of human food. But it seems that the expansion of human population and human activitiesare reducing the availability of land, suitable for food production at an alarming rate.Expanding population demands more food on one side and devours agriculturalland on the other side, which is a matter of great concern for everyone. They say that outof total lands area, 80 million hectares, 21 million hectares is cultivable. On the one hand,the nation needs more food to fulfill the demands of its increasing population while onthe other hand, each year the cultivable commanded area

(CCA) is decreasing due to thistwin menace of water logging and salinity.According to the estimates made by Soil Survey of Pakistan, the total extent of salt affected soils in the Indus Plain is more than 15 million acres out of which 7.8million acres exist within the cultivable area.This problem has destroyed millions of acres of farmland in the country. Water logging and deposition of whitish crust of salts are changing farmland into unproductiveland and many areas; the crop fields are reduces considerably.

Soil scientists say that during every five minutes, one acre fertile farmland is taken out from agriculture, because of this problem. Over the years, about 40 per cent of the irrigated cropping land in Pakistan, which produces around 90 per cent of the total agricultural output of the country, has come under water logging. This makes the land non-cultivable and poses a serious threat to the agriculture sector and to the country, as agriculture is the bloodline of Pakistan's economy. These maladies have overlapped over more than 6 million hectares in the country. These two problems are inter-linked and co-exist at most of the places. Experts' reports say that the impact of water logging on crop yields is startling. A decrease in the depth of water level within five feet inhibits root growth and causes yields of all major crops to decline rapidly. The impact of salinity on agriculture productivity is similarly severe, robbing Pakistan of about 25 per cent of its potential production of major crops. It may be added that farming is Pakistan's largest economic activity. Agriculture and small-scale forestryand fishing contributed 25 percent of GDP and employed 40 percent of the labor force.Agricultural products; especially cotton yarn, cotton cloth, raw cotton, and rice, areimportant exports.Although there is agricultural activity in all areas of Pakistan, most crops aregrown in the Indus River plain in Punjab and Sindh. Considerable development andexpansion of output has occurred since the early 1960s; however, the country is still far from realizing the large potential yield that the well-irrigated and fertile soil from theIndus irrigation system could produceAbout 48 million hectares, or 60 percent, is often classified as unusable for forestry or agriculture consists mostly of deserts, mountain slopes, and urban settlements.Thus, estimates of grazing land vary widely-between 10 percent and 70 percent of thetotal area. Some scientists categorize almost all of arid Baluchistan as range land for foraging livestock.Around 70 percent of the cropped area is in Punjab, followed by perhaps 20 percent in Sindh, less than 10 percent in the North West Frontier Province, and only 1 percent in Baluchistan. They say that considering that 80 per cent of Pakistan's cultivatedarea of about 17 million hectares is irrigated network, the Indus River irrigation system,and the threat to agriculture is not just serious, it is grim and could result in emptying thecountry's food basket. Implications of water logging and salinity can be described in oneword: "disastrous."

CAUSES OF WATER LOGGING AND SALINITY AND ITSCONTROL

Water logging and salinization are major impediment to the sustainability of irrigated lands and livelihoods of the farmers, especially the smallholders, in the affectedareas of the Indus Basin. These problems are the result of a multitude of factors,including seepage from unlined earthen canals system, inadequate provision of surfaceand subsurface drainage, poor water management practices, insufficient water suppliesand use of poor quality groundwater for irrigation. About 6.3 million ha are affected bydifferent

levels and types of salinity, out of which nearly half are under irrigatedagriculture. Since the early 1960s, several efforts have been made to improve themanagement of salt-affected and water-logged soils. These include lowering groundwater levels through deep tube wells, leaching of salts by excess irrigation, application of chemical amendments (e.g. gypsum, acids, organic matter), and the use of biological and physical methods. However, in spite of huge investments, the results have in general beendisappointing and the problems of water logging and salinity persist.This paper reviews sources, causes and extent of salinity and water logging problems in the Indus Basin. Measures taken to overcome these problems over the lastfour decades are also discussed. The results reveal that the installed drainage systemswere initially successful in lowering groundwater table and reducing salinity in affectedareas. However, poor operation and maintenance of these systems and provision of inadequate facilities for the disposal of saline drainage effluent resulted in limited overallsuccess. The paper suggests that to ensure the sustainability of irrigated agriculture in theIndus Basin, technical and financial support is needed and enhanced institutionalarrangements including coordination among different federal and provincial governmentagencies to resolve inter-provincial water allocation and water related issues is required. –

Energy Resources

Energy resources are generally defined as anything that can be used as a source of energy. Some important energy resources are oil, natural gas and coal. Access to energy resources is vital to economic development and prosperity. The world's available energy resources threatened to be strained by population growth and rapid economic growth in large countries such as China. At the same time, it's vital that the world develop new energy resources that do not contribute to global warming and other environmental problems.

THE growing energy needs

THE growing energy needs of the world are of great concern to many industry players, as well as financial entities that control the money required to purchase the capital.

In the current Jamaican energy spectrum, oil is the chief source of power for our industries and lifestyles. The Jamaica Public Service Company (JPS) has sought to venture into alternative sources of energy, such as wind and hydroelectric power.

These alternate sources need some minor revision, both from a meteorological and financial perspective. They can be truly viable and can help, in tandem with other sources of energy, to create a more stable energy policy, ultimately leading to cheaper electricity for all.

Wind energy

Wind power is energy from turbines which create the electricity as the wind turns the blades. The wind turbine is built to a certain specification in order to maximise the efficiency of the power generation. The typical turbine revolves at about 10 to 25 revolutions per minute and the type of wind to yield this rotation is about eight to 10 knots or 10 miles per hour (16 km/h).

From a meteorological perspective, wind is described as moving air and is essentially a movement from an area of high pressure to one of low pressure. This motion is enhanced when there is little to disrupt the overall flow. Thus, the most effective wind turbine energy generation should be done in areas of high elevation or over open water.

Examples of open water wind turbine installations are becoming more frequent. Installation is slightly more expensive due to the taxation requirements for operating over open water. However, these are political issues, which can be addressed by governments.

So far, the Munro wind farm, which has four turbines -- exclusive of the one located at the school -- is one such source of electricity derived from the wind. Located at about 700 metres above sea level, this station provides as much as three megawatts of electricity to the overall distribution of the JPS.

The Petroleum Corporation of Jamaica's Wigton Wind farm has stepped up the alternate energy game immensely, with the installation of nine turbines and an increased capacity reaching about 47,000 megawatts of electricity per year. The Rose Hill (Manchester) situated development boasts the Engineering Project of the Year Award.

The wind farms at Wigton and Munro together make renewable energy 11 per cent of Jamaica's total usage throughout the year. Effective site management and maintenance are key to holding these standards as public awareness increase, reducing our dependence on foreign-imported oil.

Solar energy

The sun is the closest star to the Earth and, arguably, the most misunderstood. Seen as a calm yellow ball in the sky, setting the template for romance on the Negril sunset, many fail to realise how violently the sun behaves in its natural potency as our weather engine, as it persistently hurls light beams, radiation and electromagnetic particles, light years across the fabric of space.

Solar energy is described as energy garnered from the heat of the sun, but more specifically, it is energy which is derived from physical reactions on photovoltaic cells of a solar panel as the radiated energy strikes earth's atmosphere.

Heavy meteorology and atmospheric physics is required if we are to achieve effective management and exploitation of this brilliant resource. Jamaica needs at least one dedicated solar engineer or solar physicist in its corner to monitor the actions of the sun, to measure its highly varied output and generate even more accurate weather forecasts.

The Meteorological Service should pioneer this undertaking, especially considering the effects the sun has on the service. If there was no sun, there would be no weather nor climate.

The most frequently used application of solar energy in the current Jamaican energy regime is through water heating. A solar water heater is an almost fundamental bit of equipment to attach to one's home needs. Through keen adaptation and monitoring, the solar water heater can produce near-boiling temperatures through a regular tap, which is ideal as purification. Several bacteria cannot survive in water at temperatures higher than about 80 degrees Celsius and as such, water heaters are an oblivious water purifier for many homes.

Generating electricity from solar panels has repeatedly been done effectively and the Meteorological Service is adamant that more panels in the right places can offer a very positive solution to removing Jamaica from the world's oil-based grid of power.

Water or hydroelectric energy

As far as hydroelectric plants are concerned, there are about eight in operation in Jamaica currently. There are two in St Andrew; two in Trelawny; three in St Ann and one in St Elizabeth.

Positioning these plants is important in that they have to be within rivers, which are not seasonal and have a fairly strong current throughout the wet and dry seasons. With this in mind, the parish of St Mary could be considered for another more efficient hydroelectric plant.

St Mary is among the top three wettest parishes and has significant rainfall totals, even in the dry season. There is only one seasonal river in the parish and additional training could ensure that the few which are there can support the development of electricity all year round.

Hydroelectricity has had some success with the hydroelectric station at Maggotty in St Elizabeth. The station is very old, but there are other newer and more efficient stations in St Ann and Trelawny.

The atmosphere is more resilient than we think and the earth-atmosphere system always creates balance. As scientific organisations, we can go in depth to generate facts that help to influence positive decisions by governments, making local energy policy even more viable.

Sources of energy

Energy is broadly classifies into two main groups: renewable and Non-renewable.

Renewable Energy

Renewable energy is energy which is generated from natural sources i.e. sun, wind, rain, tides and can be generated again and again as and when required.They are available in plenty and by far most the cleanest sources of energy available on this planet. For eg: Energy that we receive from the sun can be used to generate electricity. Similarly, energy from wind, geothermal, biomass from plants, tides can be used this form of energy to another form.

Here are some of the pros and cons of using renewable sources of energy:-

Pros

- The sun, wind, geothermal, ocean energy are available in the abundant quantity and free to use.
- The non-renewable sources of energy that we are using are limited and are bound to expire one day.
- Renewable sources have low carbon emissions, therefore they are considered as green and environment friendly.
- Renewable helps in stimulating the economy and creating job opportunities. The money that is used to build these plants can provide jobs to thousands to lakhs of people.
- You don't have to rely on any third country for the supply of renewable sources as in case of non-renewable sources.
- Renewable sources can cost less than consuming the local electrical supply. In the long run, the prices of electricity are expected to soar since they are based on the prices of crude oil, so renewable sources can cut your electricity bills.
- Various tax incentives in the form of tax waivers, credit deductions are available for individuals and businesses who want to go green.

Cons

- It is not easy to set up a plant as the initial costs are quite steep.
- Solar energy can be used during the day time and not during night or rainy season.
- Geothermal energy which can be used to generate electricity has side effects too. It can bring toxic chemicals beneath the earth surface onto the top and can create environmental changes.
- Hydroelectric provide pure form of energy but building dams across the river which is quite expensive can affect natural flow and affect wildlife.
- To use wind energy, you have to rely on strong winds therefore you have to choose suitable site to operate them. Also, they can affect bird population as they are quite high.

Non-Renewable Energy

Non-Renewable energy is energy which is taken from the sources that are available on the earth in limited quantity and will vanish fifty-sixty years from now. Non-renewable sources are not environmental friendly and can have serious affect on our health.They are called non-renewable because they cannot be re-generated within a short span of time. Non-renewable sources exist in the form of fossil fuels, natural gas, oil and coal.

Here are some of the pros and cons of using non-renewable sources of energy:-

Pros

- Non-renewable sources are cheap and easy to use. You can easily fill up your car tank and power your motor vehicle.
- You can use small amount of nuclear energy to produce large amount of power.
- Non-renewable have little or no competition at all. For eg: if you are driving a battery driven car your battery gets discharged then you won't be able to charge it in the middle if the road rather it is easy to find a gas pumping station.
- They are considered as cheap when converting from one type of energy to another.

Cons

- Non-renewable sources will expire some day and we have to us our endangered resources to create more non-renewable sources of energy.
- The speed at which such resources are being utilized can have serious environmental changes.
- Non-renewable sources release toxic gases in the air when burnt which are the major cause for global warming.
- Since these sources are going to expire soon, prices of these sources are soaring day by day.

Why should we conserve energy?

Energy needs to be conserved to protect our environment from drastic changes; to save the depleting resources for our future generations.The rate at which the energy is being produced and consumed can damage our world in many ways. In other words, it helps us to save the environment. We can reduce those impacts by consuming less energy.The cost of energy is rising every year. It is important for us to realize how energy is useful to us and how can we avoid it getting wasted.

To start saving energy is not a big thing at all. We can start saving the energy from our home itself, just by turning off the lights during day hours, washing clothes in cold water or using public transport instead of using our own vehicle and later can implement these things on much wider scale at society level, then at city level then district level and finally at country level. You might notice a small change in your monthly bills by

implementing these changes as they would be getting decreased more and more.With so many alternatives and so many techniques about there, if millions of people like us start doing these things, it will help us to save much more money and also help the environment.

Alternative Energy Sources

There are many reasons we are looking towards alternative energy sources. With many countries, and US cities, signing the Kyoto Treaty, efforts to reduce pollutants and greenhouse gases are a primary focus in today's culture. Alternative or renewable energy, sources show significant promise in helping to reduce the amount of toxins that are by-products of energy use. Not only do they protect against harmful by-products, but using alternative energy helps to preserve many of the natural resources that we currently use as sources of energy.

To understand how alternative energy use can help preserve the delicate ecological balance of the planet, and help us conserve the non-renewable energy sources like fossil fuels, it is important to know what types of alternative energy

Wind Power
Wind energy harnesses the power of the wind to propel the blades of wind turbines. The rotation of turbine blades is converted into electrical current by means of an electrical generator. In the older windmills, wind energy was used to turn mechanical machinery to do physical work, like crushing grain or pumping water.Wind towers are usually built together on wind farms. Now, electrical currents are harnessed by large scale wind farms that are used by national electrical grids as well as small individual turbines used for providing electricity to isolated locations or individual homes. In 2005, worldwide capacity of wind-powered generators was 58,982 megawatts, their production making up less than 1 of world-wide electricity use.

Pros

- Wind power produces no pollution that can contaminate the environment, since no chemical processes take place, like in the burning of fossil fuels, in wind power generation, there are no harmful by-products left over.
- Since wind generation is a renewable source of energy, we will never run out of it.
- Farming and grazing can still take place on land occupied by wind turbines which can help in the production of biofuels.
- Wind farms can be built off-shore.

Cons

- Wind power is intermittent. Consistent wind is needed for continuous power generation. If wind speed decreases, the turbine lingers and less electricity is generated.
- Large wind farms can have a negative effect on the scenery.

Solar Power

Solar energy is used commonly for heating, cooking, the production of electricity, and even in the desalination of seawater. Solar power works by trapping the sun's rays into solar cells where this sunlight is then converted into electricity. Additionally, solar power uses sunlight that hits solar thermal panels to convert sunlight to heat water or air. Other methods include using sunlight that hits parabolic mirrors to heat water (producing steam), or simply opening a rooms blinds or window shades to allow entering sunlight to passively heat a room.

Pros

- Solar power is a renewable resource. As long as the Sun exists, its energy will reach Earth.
- Solar power generation releases no water or air pollution, because there is no chemical reaction from the combustion of fuels.
- Solar energy can be used very efficiently for practical uses such as heating and lighting.
- The benefits of solar power are seen frequently to heat pools, spas, and water tanks all over.

Cons

- Solar power does not produce energy if the sun is not shining. Nighttime and cloudy days seriously limit the amount of energy produced.
- Solar power stations can be very expensive to build.

Geothermal Energy

Literally, geothermal means, "earth heat." Geothermal energy harnesses the heat energy present underneath the Earth. Hot rocks under the ground heat water to produce steam. When holes are drilled in the region, the steam that shoots up is purified and is used to drive turbines, which power electric generators.

Pros

- If done correctly, geothermal energy produces no harmful by-products.

- Once a geothermal plant is build, it is generally self-sufficient energy wise.
- Geothermal power plants are generally small and have little effect on the natural landscape.
-
- *Cons*

- If done incorrectly, geothermal energy can produce pollutants.
- Improper drilling into the earth can release hazardous minerals and gases.
- Geothermal sites are prone to running out of steam.

Land Resources

They occupy nearly 20 percent of the earth surface. It covers around 13000 million hectares of the area. The houses, roads and factories occupy nearly one third of the land. The forests occupy another one third of the land. The rest of land is used for ploughing and for meadows and pastures. The soil forms the surface layer of land which covers more than the 80 percent of land. The soil is defined as a natural body which keeps on changing and allows the plants to grow. It is made up of organic and inorganic materials. This definition is given by the Buckman and Brady. The branch of science which deals with the formation and distribution of soil in the different parts of the world is referred as a pedology. The professional which deals with the soil is known as the pedologist. The inorganic component in the soil is 45 percent and the organic component in the soil is 5 percent. The water component in the soil is 25 percent and the air component in the soil is 25 percent. The soil particles have fine spaces which are known as the pore spaces. These are also known as the interstices. They contain air and water along with the dissolved substances. The water and air content in the soil is inversely related to each other. The more is the water content lesser is the space for air to exist. The soil has both the plants and animals. The micro flora consists of the heterotrophic and autotrophic bacteria. It also contains the fungi and algae. The heterotrophic bacterium consists of the nitrogen and non nitrogen fixing bacteria. The nitrogen fixing bacteria can be symbiotic, non symbiotic, aerobic and anaerobic. The non nitrogen fixing bacteria can be aerobic or anaerobic. The fungus includes the yeast and mushrooms. The algae can be red or brown or green. The fauna can be micro or macro. The micro fauna includes the protozoa and nematodes. The macro fauna includes the earthworm, mites, termites, snails and mice. The soil has different types of soil particles. The mineral composition of the rock determines them along with the size of particles. It includes the gravel particles, sand, silt and clay particles. The gravel particles are mainly small stones and have a few sand particles and are used to make roads. The sand particles have pores and are aerated. They can hold little bit of water and are made up of large quartz. The silt particles are moved by the help of water. They are left at the bank of river. They are inert and are made up of large quartz. The clay particles have nutritive salts and have ability to retain water. They are not inert and react chemically. Some of their pure forms are not suitable for the growth of plants as they form a non penetrable mass. The other components of the soil mix with the clay particle and form a granular soil. This type of soil is ideal for the cultivation. It has pores as well as has the ability to hold water. It also contains the nutritive salts.

The loamy soil is made up of clay, silt and sand. The proportion of the clay is least and is half as compared to the silt and sand. The silt and sand are twice and equal in the proportion. It is also a good soil for the growth of plants as it has pores as well as has the ability to hold water. It also contains some nutritive salts. There are many factors which control the nature of soil. They are porosity, water holding capacity and the texture. They come under the physical nature of soil. The chemical nature of soil is governed by the salt content, inorganic and organic content includes certain metals. The topography, climate and the organisms also play a vital role in deciding the nature of soil. The half decayed and half synthesized part of organic material in the soil forms humus. It contains the nutrients and help in growth. It makes the soil granular by its porosity and water holding capacity. It has the ability to absorb the heat and warm the soil.

Land Degradation

The land and soil face many difficulties like deforestation, erosion, flooding, water logging, urbanization and salination. Around 33 percent of the land is going to be wasted at the end of this century. Soil erosion occurs everywhere in the world. It is more common in the Australia, India, Spain, U.S.A and Africa. The air and water erosion affects around 40 thousand hectares of land in a year. The top soil lost is the maximum. It makes around 20 percent of the total loss. Our country has the largest livestock and it leads to more of grazing. It leads to the soil erosion. The erosion is prevented by the crop rotation, mulching which leads to decrease in the evaporation and increase in the absorption, presence of suitable outlet channels which can carry the water, sowing of certain crops which check the erosion and include the grasses, groundnut, pulses and berseem. The planting of tress also checks the erosion. The control on grazing and the terracing of lands which decrease the speed of water also keeps a check on the erosion. The contour bunding has an ability to hold the rain water and control erosion. The burn agriculture along with the slash is quite common in the tribal areas. It occurs in the tropical and subtropical areas of Africa and Asia. The tress is cut and is burnt and the crops are raised on the ash formed. This phenomenon is known as jhuming and it occurs in the jhum forests in the north east India. The process is not useful as the jhuming is done frequently. The water jhuming is done in less than a decade and it destroys the forest and lead to soil erosion. The desertification is the process of change of normal soil in a desert. It occurs due to the deforestation, soil erosion, grazing and shifting. The deserts in the world are made by man. The land is degraded by the development activities of humans which include the dams, canals, railways, buses and industries. The land degradation is prevented by the crop rotation, mulching which leads to decrease in the evaporation and increase in the absorption, presence of suitable outlet channels which can carry the water, sowing of certain crops which check the erosion and include the grasses, groundnut, pulses and berseem. The planting of tress also checks the land degradation. The control on grazing and the terracing of lands which decrease the speed of water also keeps a check on the land degradation. The contour bunding has an ability to hold the rain water and control the degradation of land. The salinity must also be checked at the regular intervals and should be treated with the leaching where the ground water is not sufficient.

Soil Erosion

Soil erosion is when the soil is **blown away** by the wind or **washed away** by the rain.

Soil erosion is common in areas with steep slopes, where trees have been cut down, in droughts when crops and other vegetation grows poorly and in rural areas which are overpopulated. Nepal, in the Himalayan Mountains, has severe problems caused by increased population density and steep slopes.

Soil erosion can be reduced by building terraces on hillsides, irrigation schemes to overcome droughts, planting more trees to bind the soil together and make wind breaks, and using fertilisers in overpopulated areas to make the soil more fertile. It is very important that the farming techniques used do not damage the structure of the soil, as this makes it easily eroded. Good farming techniques include contour ploughing, crop rotation and keeping the soil rich in humus.

An example of poor techniques was the "Dust Bowl" in the mid-western states of the U.S.A. in the 1930's. Farmers exhausted the soil by monoculture and left the soil bare after harvesting. Soil erosion is a problem of the developed world as well as the developing.

Desertification

The world's great deserts were formed by natural processes interacting over long intervals of time. During most of these times, deserts have grown and shrunk independent of human activities. Paleodeserts, large sand seas now inactive because they are stabilized by vegetation, extend well beyond the present margins of core deserts, such as the Sahara. In some regions, deserts are separated sharply from surrounding, less arid areas by mountains and other contrasting landforms that reflect basic structural differences in the regional geology. In other areas, desert fringes form a gradual transition from a dry to a more humid environment, making it more difficult to define the desert border.

These transition zones have very fragile, delicately balanced ecosystems. Desert fringes often are a mosaic of microclimates. Small hollows support vegetation that picks up heat from the hot winds and protects the land from the prevailing winds. After rainfall the vegetated areas are distinctly cooler than the surroundings. In these marginal areas, human activity may stress the ecosystem beyond its tolerance limit, resulting in degradation of the land. By pounding the soil with their hooves, livestock compact the substrate, increase the proportion of fine material, and reduce the percolation rate of the soil, thus encouraging erosion by wind and water. Grazing and the collection of firewood reduces or eliminates plants that help to bind the soil.

UNIT 5th

Environmental studies

Environmental studies is the interdisciplinary academic field which systematically studies human interaction with the environment in the interests of solving complex problems. It is a broad field of study that includes also the natural environment, built environment, and the sets of relationships between them. The field encompasses study in basic principles of ecology and environmental science, as well as associated subjects such as ethics, policy, politics, law, economics, philosophy, environmental sociology and environmental justice, planning, pollution control and natural resource management.

Environmental Pollution

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Pollution - Environmental pollution is any discharge of material or energy into water, land, or air that causes or may cause acute (short-term) or chronic (long-term) detriment to the Earth's ecological balance or that lowers the quality of life. Pollutants may cause primary damage, with direct identifiable impact on the environment, or secondary damage in the form of minor perturbations in the delicate balance of the biological food web that are detectable only over long time periods.

Until relatively recently in humanity's history, where pollution has existed, it has been primarily a local problem. The industrialization of society, the introduction of motorized vehicles, and the explosion of the human population, however, have caused an exponential growth in the production of goods and services. Coupled with this growth has been a tremendous increase in waste by-products. The indiscriminate discharge of untreated industrial and domestic wastes into waterways, the spewing of thousands of tons of particulates and airborne gases into the atmosphere, the "throwaway" attitude toward solid wastes, and the use of newly developed chemicals without considering potential consequences have resulted in major environmental disasters, including the formation of smog in the Los Angeles area since the late 1940s and the pollution of large areas of the Mediterranean Sea. Technology has begun to solve some pollution problems (see pollution control), and public awareness of the extent of pollution will eventually force governments to undertake more effective environmental planning and adopt more effective antipollution measures.

Different Types of Pollution

WATER POLLUTION

Water pollution is the introduction into fresh or ocean waters of chemical, physical, or biological material that degrades the quality of the water and affects the organisms living in it. This process ranges from simple addition of dissolved or suspended solids to discharge of the most insidious and persistent toxic pollutants (such as pesticides, heavy metals, and nondegradable, bioaccumulative, chemical compounds).

Conventional

Conventional or classical pollutants are generally associated with the direct input of (mainly human) waste products. Rapid urbanization and rapid population increase have produced sewage problems because treatment facilities have not kept pace with need. Untreated and partially treated sewage from municipal wastewater systems and septic tanks in unsewered areas contribute significant quantities of nutrients, suspended solids, dissolved solids, oil, metals (arsenic, mercury, chromium, lead, iron, and manganese), and biodegradable organic carbon to the water environment.

Conventional pollutants may cause a myriad of water pollution problems. Excess suspended solids block out energy from the Sun and thus affect the carbon dioxide-oxygen conversion process, which is vital to the maintenance of the biological food chain. Also, high concentrations of suspended solids silt up rivers and navigational channels, necessitating frequent dredging. Excess dissolved solids make the water undesirable for drinking and for crop irrigation.

Although essential to the aquatic habitat, nutrients such as nitrogen and phosphorus may also cause overfertilization and accelerate the natural aging process (eutrophication) of lakes. This acceleration in turn produces an overgrowth of aquatic vegetation, massive algal blooms, and an overall shift in the biologic community--from low productivity with many diverse species to high productivity with large numbers of a few species of a less desirable nature. Bacterial action oxidizes biodegradable organic carbon and consumes dissolved oxygen in the water. In extreme cases where the organic-carbon loading is high, oxygen consumption may lead to an oxygen depression: (less than 2 mg/l compared with 5 to 7 mg/l for a healthy stream) is sufficient to cause a fish kill and seriously to disrupt the growth of associated organisms that require oxygen to survive.

Nonconventional

The nonconventional pollutants include dissolved and particulate forms of metals, both toxic and nontoxic, and degradable and persistent organic carbon compounds discharged into water as a by-product of industry or as an integral part of

marketable products. More than 13,000 oil spills of varying magnitude occur in the United States each year. Thousands of environmentally untested chemicals are routinely discharged into waterways; an estimated 400 to 500 new compounds are marketed each year. In addition, coal strip mining releases acid wastes that despoil the surrounding waterways. Nonconventional pollutants vary from biologically inert materials such as clay and iron residues to the most toxic and insidious materials such as halogenated hydrocarbons (DDT, kepone, mirex, and polychlorinated biphenyls--PCB). The latter group may produce damage ranging from acute biological effects (complete sterilization of stretches of waterways) to chronic sublethal effects that may go undetected for years. The chronic low-level pollutants are proving to be the most difficult to correct and abate because of their ubiquitous nature and chemical stability.

THERMAL POLLUTION

Thermal pollution is the discharge of waste heat via energy dissipation into cooling water and subsequently into nearby waterways. The major sources of thermal pollution are fossil-fuel and nuclear electric-power generating facilities and, to a lesser degree, cooling operations associated with industrial manufacturing, such as steel foundries, other primary-metal manufacturers, and chemical and petrochemical producers.

The discharge temperatures from electric-power plants generally range from 5 to 11 C degrees (9 to 20 F degrees) above ambient water temperatures. An estimated 90% of all water consumption, excluding agricultural uses, is for cooling or energy dissipation.

The discharge of heated water into a waterway often causes ecologic imbalance, sometimes resulting in major fish kills near the discharge source. The increased temperature accelerates chemical-biological processes and decreases the ability of the water to hold dissolved oxygen. Thermal changes affect the aquatic system by limiting or changing the type of fish and aquatic biota able to grow or reproduce in the waters. Thus rapid and dramatic changes in biologic communities often occur in the vicinity of heated discharges.

Soil POLLUTION

Land pollution is the degradation of the Earth's land surface through misuse of the soil by poor agricultural practices, mineral exploitation, industrial waste dumping, and indiscriminate disposal of urban wastes.

Soil Misuse

Soil erosion--a result of poor agricultural practices--removes rich humus topsoil developed over many years through vegetative decay and microbial degradation and thus strips the land of valuable nutrients for crop growth. Strip mining for minerals and coal lays waste thousands of acres of land each year, denuding the Earth and subjecting the mined area to widespread erosion problems. The increases in urbanization due to population pressure presents additional soil-

erosion problems; sediment loads in nearby streams may increase as much as 500 to 1,000 times over that recorded in nearby undeveloped stretches of stream. Soil erosion not only despoils the Earth for farming and other uses, but also increases the suspended-solids load of the waterway. This increase interferes with the ecological habitat and poses silting problems in navigation channels, inhibiting the commercial use of these waters.

Solid Waste

In the United States in 1988 municipal wastes alone--that is, the solid wastes sent by households, business, and municipalities to local landfills and other waste-disposal facilities--equaled 163 million metric tons (1980 million U.S. tons), or 18 k (40lb) per person, according to figures released by the Environmental Protection Agency. Additional solid wastes accumulate from mining, industrial production, and agriculture. Although municipal wastes are the most obvious, the accumulations of other types of wastes are the most obvious, the accumulations of other types of waste are far greater, in many instances are more difficult to dispose of, and present greater environmental hazards.

The most common and convenient method of disposing of municipal solid wastes is in the sanitary landfill. The open dump, once a common eyesore in towns across the United States, attracted populations of rodents and other pests and often emitted hideous odors; it is now illegal. Sanitary landfills provide better aesthetic control and should be odor-free. Often, however, industrial wastes of unknown content are commingled with domestic wastes. Groundwater infiltration and contamination of water supplies with toxic chemicals have recently led to more active control of landfills and industrial waste disposal. Careful management of sanitary landfills, such as providing for leachate and runoff treatment as well as daily coverage with topsoil, has alleviated most of the problems of open dumping. In many areas, however, space for landfills is running out and alternatives must be found.

Recycling of materials is practical to some extent for much municipal and some industrial wastes, and a small but growing proportion of solid wastes is being recycled. When wastes are commingled, however, recovery becomes difficult and expensive. New processes of sorting ferrous and nonferrous metals, paper, glass, and plastics have been developed, and many communities with recycling programs now require refuse separation. Crucial issues in recycling are devising better processing methods, inventing new products for the recycled materials, and finding new markets for them.

Incineration is another method for disposing of solid wastes. Advanced incinerators use solid wastes as fuel, burning quantities of refuse and utilizing the resultant heat to make steam for electricity generation. Wastes must be burned at very high temperatures, and incinerator exhausts must be equipped with sophisticated scrubbers and other devices for removing dioxins and other toxic

pollutants. Problems remain, however: incinerator ash contains high ratios of heavy metals, becoming a hazardous waste in itself, and high-efficiency incinerators may discourage the use of recycling and other waste-reduction methods.

Composting is increasingly used to treat some agricultural wastes, as well as such municipal wastes as leaves and brush. Composting systems can produce usable soil conditioners, or humus, within a few months (see compost).

PESTICIDE POLLUTION

Pesticides are organic and inorganic chemicals originally invented and first used effectively to better the human environment by controlling undesirable life forms such as bacteria, pests, and foraging insects. Their effectiveness, however, has caused considerable pollution. The persistent, or hard, pesticides, which are relatively inert and nondegradable by chemical or biologic activity, are also bioaccumulative; that is, they are retained within the body of the consuming organism and are concentrated with each ensuing level of the biologic food chain. For example, DDT provides an excellent example of cumulative pesticide effects. (Although DDT use has been banned in the United States since 1972, it is still a popular pesticide in much of the rest of the world.) DDT may be applied to an area so that the levels in the surrounding environment are less than one part per billion. As bacteria or other microscopic organisms ingest and retain the pesticide, the concentration may increase several hundred- to a thousandfold. Concentration continues as these organisms are ingested by higher forms of life--algae, fish, shellfish, birds, or humans. The resultant concentration in the higher life forms may reach levels of thousands to millions of parts per billion.

Many pesticides are nondiscriminatory; that is, they are not specific for a particular plant or organism. A dramatic example of this effect is DDE (a product of the breakdown of DDT), which effectively inhibits the ability of birds to provide sufficient calcium deposits for their eggs, producing fragile shells and a high percentage of nested eggs that break prematurely. Another reported side effect of pesticides is their effect on the nervous system of animals and fish; they can cause instability, disorientation, and, in some cases, death. These examples are generally a result of relatively high body residuals producing acute (short-term) readily recordable results.

The long-term (chronic) effects of persistent pesticides are virtually unknown, but many scientists believe they are as much an environmental hazard as are the acute effects. Nonpersistent (readily degradable) pesticides or substitutes, insect sterilization techniques, hormone homologues that check or interfere with maturation stages, and introduction of animals that prey on the pests present a potentially brighter picture for pest control with significantly reduced environmental consequences.

NUCLEAR POLLUTION

Radiation pollution is any form of ionizing or nonionizing radiation that results from human activities. The most well-known radiation results from the detonation of nuclear devices and the controlled release of energy by nuclear-power generating plants (see

nuclear energy). Other sources of radiation include spent-fuel reprocessing plants, by-products of mining operations, and experimental research laboratories. Increased exposure to medical X rays and to radiation emissions from microwave ovens and other household appliances, although of considerably less magnitude, all constitute sources of environmental radiation.

Public concern over the release of radiation into the environment greatly increased following the disclosure of possible harmful effects to the public from nuclear weapons testing, the accident (1979) at the Three Mile Island nuclear-power generating plant near Harrisburg, Pa., and the catastrophic 1986 explosion at Chernobyl, a Soviet nuclear power plant. In the late 1980s, revelations of major pollution problems at U.S. nuclear weapons reactors raised apprehensions even higher.

The environmental effects of exposure to high-level ionizing radiation have been extensively documented through postwar studies on individuals who were exposed to nuclear radiation in Japan. Some forms of cancer show up immediately, but latent maladies of radiation poisoning have been recorded from 10 to 30 years after exposure. The effects of exposure to low-level radiation are not yet known. A major concern about this type of exposure is the potential for genetic damage.

Radioactive nuclear wastes cannot be treated by conventional chemical methods and must be stored in heavily shielded containers in areas remote from biological habitats. The safest of storage sites currently used are impervious deep caves or abandoned salt mines. Most radioactive wastes, however, have half-lives of hundreds to thousands of years, and to date no storage method has been found that is absolutely infallible.

NOISE POLLUTION

Noise pollution has a relatively recent origin. It is a composite of sounds generated by human activities ranging from blasting stereo systems to the roar of supersonic transport jets. Although the frequency (pitch) of noise may be of major importance, most noise sources are measured in terms of intensity, or strength of the sound field. The standard unit, one decibel (dB), is the amount of sound that is just audible to the average human. The decibel scale is somewhat misleading because it is logarithmic rather than linear; for example, a noise source measuring 70 dB is 10 times as loud as a source measuring 60 dB and 100 times as loud as a source reading 50 dB. Noise may be generally associated with industrial society, where heavy machinery, motor vehicles, and aircraft have become everyday items. Noise pollution is more intense in the work environment than in the general environment, although ambient noise increased an average of one dB per year during the 1980s. The average background noise in a typical home today is between 40 and 50 decibels. Some examples of high-level sources in the environment are heavy trucks (90 dB at 15 m/50 ft), freight trains (75 dB at 15 m/50 ft), and air conditioning (60 dB at 6 m/20 ft).

The most readily measurable physiological effect of noise pollution is damage to hearing, which may be either temporary or permanent and may cause disruption of normal activities or just general annoyance. The effect is variable, depending upon individual

susceptibility, duration of exposure, nature of noise (loudness), and time distribution of exposure (such as steady or intermittent). On the average an individual will experience a threshold shift (a shift in an individual's upper limit of sound detectability) when exposed to noise levels of 75 to 80 dB for several hours. This shift will last only several hours once the source of noise pollution is removed. A second physiologically important level is the threshold of pain, at which even short-term exposure will cause physical pain (130 to 140 dB). Any noise sustained at this level will cause a permanent threshold shift or permanent partial hearing loss. At the uppermost level of noise (greater than 150 dB), even a single short-term blast may cause traumatic hearing loss and physical damage inside the ear.

Although little hard information is available on the psychological side effects of increased noise levels, many researchers attribute increased irritability, lower productivity, decreased tolerance levels, increased incidence of ulcers, migraine headaches, fatigue, and allergic responses to continued exposures to high-level noises in the workplace and the general environment.

AIR POLLUTION

Air pollution is the accumulation in the atmosphere of substances that, in sufficient concentrations, endanger human health or produce other measured effects on living matter and other materials. Among the major sources of pollution are power and heat generation, the burning of solid wastes, industrial processes, and, especially, transportation. The six major types of pollutants are carbon monoxide, hydrocarbons, nitrogen oxides, particulates, sulfur dioxide, and photochemical oxidants.

Local and Regional

Smog has seriously affected more persons than any other type of air pollution. It can be loosely defined as a multisource, widespread air pollution that occurs in the air of cities. Smog, a contraction of the words smoke and fog, has been caused throughout recorded history by water condensing on smoke particles, usually from burning coal. The infamous London fogs--about 4,000 deaths were attributed to the severe fog of 1952--were smog of this type. Another type, ice fog, occurs only at high latitudes and extremely low temperatures and is a combination of smoke particles and ice crystals.

As a coal economy has gradually been replaced by a petroleum economy, photochemical smog has become predominant in many cities. Its unpleasant properties result from the irradiation by sunlight of hydrocarbons (primarily unburned gasoline emitted by automobiles and other combustion sources) and other pollutants in the air. Irradiation produces a long series of photochemical reactions (see photochemistry). The products of the reactions include organic particles, ozone, aldehydes, ketones, peroxyacetyl nitrate, and organic acids and other oxidants. Sulfur dioxide, which is always present to some extent, oxidizes and hydrates to form sulfuric acid and becomes part of the particulate matter. Furthermore, automobiles are polluters even in the absence of photochemical

reactions. They are responsible for much of the particulate material in the air; they also emit carbon monoxide, one of the most toxic constituents of smog.

All types of smog decrease visibility and, with the possible exception of ice fog, are irritating to the respiratory system. Statistical studies indicate that smog is a contributor to malignancies of many types. Photochemical smog produces eye irritation and lacrimation and causes severe damage to many types of vegetation, including important crops. Acute effects include an increased mortality rate, especially among persons suffering from respiratory and coronary ailments. Air pollution also has a deleterious effect on works of art (see art conservation and restoration).

Air pollution on a regional scale is in part the result of local air pollution--including that produced by individual sources, such as automobiles--that has spread out to encompass areas of many thousands of square kilometers. Meteorological conditions and landforms can greatly influence air-pollution concentrations at any given place, especially locally and regionally. For example, cities located in bowls or valleys over which atmospheric inversions form and act as imperfect lids are especially likely to suffer from incidences of severe smog. Oxides of sulfur and nitrogen, carried long distances by the atmosphere and then precipitated in solution as acid rain, can cause serious damage to vegetation, waterways, and buildings.

Global

Humans also pollute the atmosphere on a global scale, although until the early 1970s little attention was paid to the possible deleterious effects of such pollution. Measurements in Hawaii suggest that the concentration of carbon dioxide in the atmosphere is increasing at a rate of about 0.2% every year. The effect of this increase may be to alter the Earth's climate by increasing the average global temperature. Certain pollutants decrease the concentration of ozone occurring naturally in the stratosphere, which in turn increases the amount of ultraviolet radiation reaching the Earth's surface. Such radiation may damage vegetation and increase the incidence of skin cancer. Examples of stratospheric contaminants include nitrogen oxides emitted by supersonic aircraft and chlorofluorocarbons used as refrigerants and aerosol-can propellants. The chlorofluorocarbons reach the stratosphere by upward mixing from the lower parts of the atmosphere (see ozone layer). It is believed that these chemicals are responsible for the noticeable loss of ozone over the Polar Regions that have occurred in the 1980s.

BY

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