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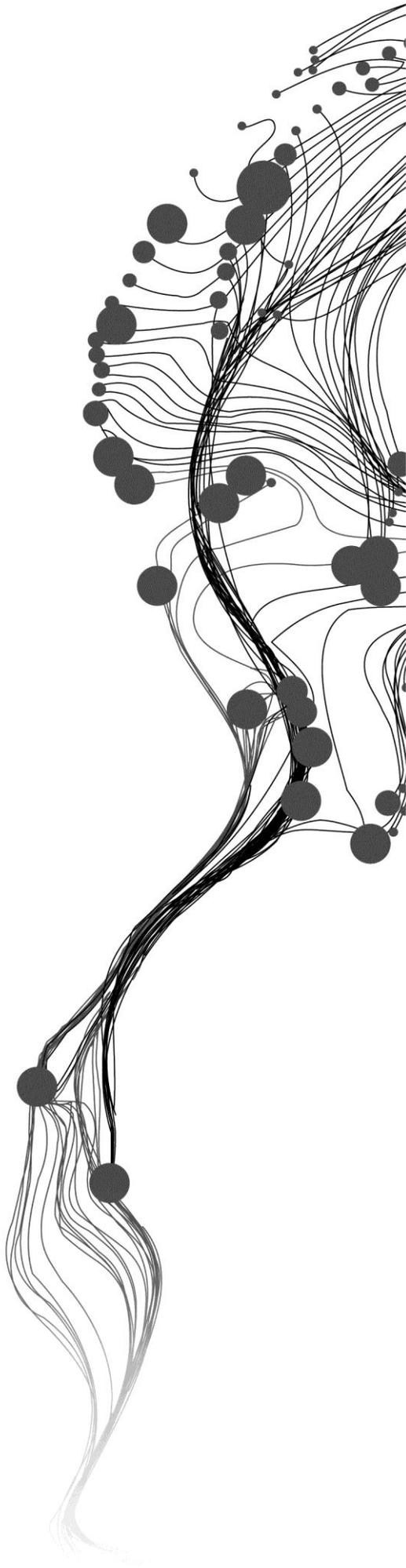
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[March, 2011]

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[SPACE, SPATIAL PLANNING AND SPATIAL QUALITIES]

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ABSTRACT

Anthropogenic activities have influenced the natural processes that form and shape the Earth deregulating them in the process. Climate change is currently one of the most pressing global issues directly related to disturbances of natural systems. Environmental problems are also linked to droughts, flooding, extreme weather conditions, ozone-layer depletion, loss of biodiversity, shortage of water and rising sea levels. Challenging local environmental problems have global impact with varying degrees of local severity such that local pollution of air, water and soil eventually leads to global pollution. There arises a scale problem where small spatial problems also have become global spatial problems.

Spatial planning as the most explicit spatial policy tries to balance economic development and environmental protection. Spatial planning could be useful for steering the behaviour of individuals and firms in space to achieve sustainable development. Although it is generally appreciated that the notion of sustainability has implications for spatial planning, the relationships between the environment, economy and society is not clear from theoretical and practical perspectives of spatial planning.

There seems to be a knowledge gap between social and natural science disciplines which has resulted in a profound and pervasive disarticulation of knowledge. And the various forms of specialized knowledge are not knit together holistically. For instance the natural scientists know little about what social scientists are doing. Sometimes an invention or discovery in one body of knowledge remains undisclosed to other intellectuals who sometimes rediscover it leading to duplication of efforts in human attempt to understand the world.

A model of practical approach to theory and practice of spatial planning is proposed in this thesis – largely a literature study. A multi-disciplinary approach, spatial thinking, and spatial planning policy were employed to decipher concepts from different disciplines and especially when they are used in more than one discipline. Philosophy, Mathematics, Ecology, Natural Science, Geo-information Science, Environmental Economics, Economic theory, Economics of Public goods, Public Administration, and Law provided the theoretical foundations, historical and social context and scope. And the main concepts are space, governance, environment, land cover/land use, and public goods.

The thesis analyzes spatial planning as the process of locating public goods in space. There are two types of public goods allocation in spatial planning:

1. The land based delivery of spatial goods (which are basically infrastructural development).
2. Spatial quality (which involves the negotiation of restriction on private land for the provision of public goods).

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1. CHAPTER 1: INTRODUCTION

1.1. Introduction

Governmental processes have a geographic component when related to spatial problems. Inter-governmental processes, participatory public policy formulation and the provision of relevant information services to citizens (such as risk information) are spatial in nature. See Georgiadou & Miscione (2009).

However, public sector information is interpretive, incomplete and strategically manipulated (Stone, 2002) hence the assumption that once geo-information is available to people who need it, in the form it is needed in a timely manner, it can be useful for decision making (Georgiadou & Miscione, 2009). In effect the availability of spatial information drives decision making processes. Moreover, policy making initiates the collection of spatial information; after all governance occurs in space. Most public policies are implemented in the places where people are geographically located.

Despite the strong connection between public policy and space, social science and geo-information science technology the disciplines concerned with these critical issues are segregated both in practice and in theory. There seems to be a division of labour among scientists (social and natural) which has resulted in a profound and pervasive disarticulation of knowledge and the various forms of specialized knowledge are not knit together holistically. For instance the natural scientists know little about what social scientists are doing. Sometimes an invention or discovery in one body of knowledge remains undisclosed to other intellectuals who sometimes rediscover it leading to duplication of efforts in human attempt to understand the world.

Relevant spatial information offers objective data for state agencies (such as spatial planning, land use planning, land administration and cadastre) for societal decision making. The objective of the state is to ensure good governance and sustainable development in such a way that vital natural resources are preserved and conserved.

The main aim of government in policy making is to boost living standards by increasing productivity of citizens. Quality of life has long been an implicit or explicit policy goal of every state. Every government has a development agenda which promises its citizens a better livelihood. Fundamental to the pursuit of high quality of life is setting objectives such as providing clean drinking water for the population, provision of roads, national security, law and order. The state implements its development agenda through spatial planning by providing infrastructural facilities.

1.1.1. Objectives and Scope:

In this thesis, abstract interpretations of literature gathered from social science and natural science was used to explain social and natural facts relating to space, governance and spatial qualities. A model of practical approach to theory and practice of spatial planning is proposed in this thesis – largely a literature study. A multi-disciplinary approach, spatial thinking, and spatial planning policy were employed to understand concepts from different disciplines and especially when they are used in more than one discipline. Philosophy, Mathematics, Ecology, Natural Science, Geo-information Science, Environmental

Economics, Economic theory, Economics of Public goods, Policy sciences, Public Administration, and Law provided the theoretical foundations, historical and social context and scope. And the main concepts are space, governance, environment, land cover/land use, and public goods.

The objective of this thesis is to analyze spatial planning as the process of locating public goods in space with the preposition that, there are two types of public goods allocation in spatial planning:
1. The land based delivery of spatial goods (which are basically infrastructural development).
2. Spatial quality (which involves the negotiation of restriction on private land for the provision of public goods).

1.1.2. Structure of this thesis:

This thesis is structured in eight chapters. The first chapter is the introduction. This chapter also contains the main objective and scope of the thesis. The structure of the thesis is also outlined.

The second chapter discusses the concept of space from different disciplinary perspectives. The aim of this chapter is to decipher the meaning of "space" from the literature and find out if space has measurable dimensions and whether space can be studied as an object where smaller spaces aggregate to form bigger spaces. The contribution of philosophy, mathematics and geo-information and social science are elaborated.

The third chapter focuses on governance and its relationship with space. The relevance of spatial policy and spatial planning to resolve environmental issues resulting from externalities generated by human processes is emphasized.

Chapter four takes a critical look at the concept environment and the deteriorating impact of human activities on it. The issues of scales and levels arise in this discussion as environmental problems are local, regional, national and global in nature. Again spatial planning interventions are needed to salvage the situation at local, regional, national and global scales and levels.

In chapter five data acquisition for spatial planning is discussed. Geo-information science and earth observation becomes extremely relevant for collection, and processing spatial information for spatial planning.

Chapter six discusses the spatial planning process where spatial planning balances economic development and environmental protection to ensure sustainability. Infrastructure developments and restrictions are indispensable tools used in spatial planning. The functionality of these tools is elaborated in this chapter.

In chapter seven public goods concepts are introduced, as another perspective from which spatial planning functions can be analyzed. Most literature on public goods from economics discusses the characteristics of non-excludability and non-rivalry. In this chapter the public administrative perspective of public goods as goods provided by the state is fundamental to analyzing spatial planning.

The last chapter elaborates on the concept of spatial qualities where spatial quality is conceptually perceived as the attributes of smaller spaces such as neighbourhood and landscape units. Disciplines such as law, public administration, policy sciences and spatial planning lend concepts that form the crust of this chapter. This chapter also integrates space and governance as discussed in Chapters 2 and 3 in a holistic manner.

2. CHAPTER 2: SPACE

This chapter elaborates on the concept of space. It considers philosophical discourse on the concept of space and the perspectives of various sciences about space. It also considers types and hierarchies of spaces, and the relevance of places and place names for producing/consuming meaning.

2.1.   Philosophers and space

According to Comte's law of three stages, human effort to understand the world have passed through theological stage, where thoughts were guided by religious ideas and the belief that society was an expression of God's will; through to the metaphysical stage where the world was seen in natural terms to the positivist stage where empirical evidence is drawn from observation, comparison and experimentation. See Giddens & Griffiths (2006)

The quest for discovering the nature of space has been the central aspect of philosophy for centuries. Most philosophical debates occurred in the metaphysical stage when natural explanations were attributed to human understanding of the world. It was the time when several theories were developed which eventually led to the birth of scientific knowledge. Early philosophy was concerned with issues related to the ontology, epistemology and character of space and time. Great debates were raised on issues such as whether or not space and time exist independently of the mind; whether they (i.e. space and time) exist independently of each other; whether time other than the present moment exists; what accounts for time's apparent unconditional flow.

Opposing philosophical views on issues as named above resulted in a situation where thinkers fight with ideas. Greek philosophers believed in the infinite past of the universe i.e. past with no beginning, while Theologians claimed that the universe has a finite past with a beginning. A view shared by Judaism, Christianity and Islam due to their belief that the world was created by God. "In the beginning God, created the heaven and the earth." (Genesis 1:1)

From a realist view point in ontology, time and space have existence apart from human mind; Immanuel Kent asserts that space and time are elements of a synthetic framework people use to structure their experiences. Idealists deny the existence of objects independent of the mind. To idealists, time is an illusion.

Some philosophers define the notions of space and time as real objects. This position is called absolutism; names like Isaac Newton and Samuel Clarke are associated with this philosophical view. They argue that the necessity of the existence of absolute space to account for certain kinds of natural phenomena can only be explained by the presence of some third thing (which they call ABSOLUTE SPACE). Rationalist's views opposing these claims seek sufficient reason to explain space and time. Rationalism defines notions of space and time as merely ordering upon actual objects. Gottfried Leibniz and other philosophers argue based on the philosophical principles of sufficient reason and the principle of the identity of indiscernible. The interesting details of the debates are outside the scope of this thesis.

In recent past, Popper (1959) asserts that the empirical basis of objective science has nothing 'absolute' about it. However, [Reininger (1916, p. 29) as cited by Popper (1959)]emphasized the relevance of Absolute Space in this quote.

"Metaphysics as science is impossible ….. because although the *absolute* is indeed *experienced*, and for that reason *can be intuitively felt*, it yet refuses to be expressed in words." (The italics is for emphasis)

The philosophical concept absolute has its origin in Latin word 'absolutus' which means freed/unrestricted. Absolute in philosophy refers to a value or principle regarded as universally valid or able to be viewed without relation to other things. It is sometimes conceived of as the source from which all beings emanate. Absolute is often used as an alternate term for a "God" or "the Divine". The absolute is non-comparative, non-relative and non-relational to anything else.

The literature always mentions space and time emphasizing the strong and almost inseparable relationship between them. Following the principle of the identity of indiscernible, if there is no way of telling two entities apart; then they are one and the same thing.

A practical way of understanding this simultaneous occurrence of space and time could be observed from everyday life. "All interactions occur in a particular place and have a specific duration of time" Giddens & Griffiths (2006). As we move through temporal zones of the day we are also often moving across space. For instance, to get to work we may take a bus from one area to another. Again business is generally conducted within the hours of 8am to 5pm on week days. When social scientists analyze the context of social interaction, they often consider people's movement across time and space. The reason being that social life is zoned in time-space, so when people meet in places they are bounded by both temporal and spatial dimensions. Holding business conference occurs at a specified location within a certain time frame irrespective of whether participants are interacting face to face or using virtual videos (ibid).

In this thesis space is the big thing in which we see the elements such as the globe. Space is a boundless, three-dimensional extent in which objects and events occur and have relative position and direction. See (Space In Britannica Encyclopedia, 2011). Space is abstractly conceived as the object in which 'environment' can be found. Rapoport (1970) erroneously perceives space as an aspect of environment. He assumes that environment is bigger than space. A view which is contrary to the way space should be perceived, environment is actually a 'part of' space.

The word space is used in several settings. Examples include social space, work space, cyber space, thinking space, religious space, living space etc. Some of these types of spaces are discussed in this thesis but others are not because on a whole we zoom out on space hence the details fall outside the scope of this thesis.

When space is perceived as an object, it always denotes the sort of aggregate concept where smaller objects are 'part-of' another bigger object. Thus space can be modelled in levels and scales where the municipality is part of the province and the province is also part of the state. In other words smaller spaces sum up to form bigger spaces. And smaller spaces inherit the characteristics of bigger spaces. However, smaller spaces can be observed in more detail hence other characteristics can be identified in those spaces. It is not as if such characteristics did not exist before, but the reason is that they were hidden; too small to notice in the aggregate space. See Stoter (2004).

From space you can zoom in and start observing other elements in space – the physical space. The physical space is the sum of the land space and outer space. The outer space is the place from which the earth (land space) is observed. Earth observation satellites are placed in space for several purposes including communication and weather forecast. Zooming in to the globe, we observe the earth through the skies to see the vast piece of land and water body.   As we zoom further in to land space we encounter places (meaningful locations) which are either privately owned or public spaces.

Spatial time changes occur as we zoom into smaller spaces over time. Interestingly, when images are taken from space, time and space are frozen on that image. An image of the same location taken at a different time is definitely not the same as the first one. The reason being that time change has occurred.

Representing abstractions of real world is not limited to only natural scientific research. As Emile Durkheim states "social facts" can be studied as things. By this he meant that social life could be analyzed as rigorously as objects or events in nature. Giddens & Griffiths (2006). This principle of sociology corresponds to the object oriented modelling in the natural sciences where objects represent an abstraction of the real world. By this technique space can be modelled as an object where smaller spaces are part of bigger spaces and thus share in its characteristics.

2.2.   The concept "space"

The linguistic meaning of the word space categorizes it as both a noun and a verb with diverse meanings. As a noun space could mean:

- A continuous area or expanse which is free or unoccupied
- An interval of time often used in language to emphasize the brevity of time
- The dimension of height, depth and width within which all things exist and move. Outer space is also used in this sense to mean the physical universe beyond the earth's atmosphere; the near-vacuum extending between the planet and stars.
- In mathematics space refers to a concept generally regarded as a set of points having some specified structure.

When two or more items are positioned at a distance from one another such as in writing; space becomes a verb. (Fowler, Fowler, & Sykes, 1976)

Geometric space used in spatial data can be described as a three-dimensional space where for every point the three-dimensional coordinates can be determined as a triplet (x, y, and z). See (ITC Educational Textbook Series, 2009a)

2.3.   Cartesian space and Euclidian space

In mathematics, Euclidean space is the Euclidean plane and three-dimensional space of Euclidean geometry, as well as the generalizations of these notions to higher dimensions.

Euclidean space refers to "a space in which locations are identified by coordinates, and with which usually the standard, Pythagorean distance function between locations is associated. Other functions such as direction and angle can also be present. Euclidean space is n-dimensional, and we must make a choice of

n, being 1, 2, 3 or more. The case n=2 gives us the Euclidean plane, which is the most common Euclidean space in GIS use." GIS application operates on the assumption that relevant spatial phenomena occur in two or three-dimensional Euclidean space. GIS applies the three dimensional space where coordinates are triplets (x, y, and z) however in situations where coordinates are pairs (x, y) but some coordinates are associated with a single elevation, it is termed two-and-half-dimensional space. (ITC Educational Textbook Series, 2009a).

Most solid objects have at least three spatial dimensions (length, width, height), and a temporal dimension (time) where the spatial object changes over time. There are different aspects of an object, different levels of details, and all at various times and different repeatability rates.

Of interest are objects located on the surface of the earth for which geodetic coordinates can be defined. It indicates the exact location of an object on the Earth's surface.

2.4.   Place

[Agnew (1987) as cited by Cresswell (2004)]has outlined three fundamental aspects of place as "a meaningful location". The three aspects are:

- Location, place is often used in everyday life with the notion of finding location (the 'where'). But places are not always stationary; it could be mobile such as a moving car. A place such as Enschede, ITC is a location. It has fixed objective co-ordinates on the Earth's surface hence it can be located on a map. It also has a history and an identity.

- Locale, means the material setting for social relations thus the actual shape of place within which people conduct their lives as individuals, as men or women, as white or black, straight or gay. As well as being located and having a material form, place must have some relationship to humans and the human capacity to produce and consume meaning.

- Sense of place, refers to the subject and emotional attachment people have to place.

Thus places are spaces people are attached to in one way or another. Places are spaces people have made meaningful. It is not surprising that many geographers define geography as "the study of place".

Places have a history, a pleasant memory of social, political, economic, religious, marital, and educational interaction that has taken place within space and time. Many countries have monuments that remind them of their historic past. A typical example is the independence square in Ghana, which commemorates the struggle against colonial rule and subsequent declaration of independence by the first president of Ghana, Dr. Osagyefo Kwame Nkrumah. London also has an unrivalled and artistic heritage, helping to confirm its place as a vibrant and dynamic capital.

The very complicated nature of the experience of place; makes it an effective tool in the re-production of memory. [Casey (1987) as cited by Cresswell (2004)] describes place memory as "the ability of place to make the past come to life in the present and thus contribute to the production and reproduction of social memory."

Historically, spaces mean something to people; it could be the haunting of past inhabitation or memory of the "good old days". Generally, geographic co-ordinate of space does not mean much to people. Place names have a meaning; by replacing a set of co-ordinates (numbers) with a name, spaces become more meaningful to people.

2.4.1. Place Names

A distinguishing feature on most geographical maps is the place names. Geographical names are meaningful to people. The name of a place uniquely identifies it from other places; they provide a useful geographical reference system. Of interest is that spaces become places only when people live there and give it a place name.

It is striking to discover that the places where someone grows up and lives may discriminate among people of the world whether they become prosperous or poor. See Dekker (2003).

2.4.2. Public space

Public space refers to land which is freely accessible to all and where public services are available such as streets, parks, traffic lights etc. Public space is neither exclusive to a person or group of persons nor rivalrous. It is open to all persons. Public spaces are usually owned by the state, the municipality, or the community.

People's demand for long-term liveability has shifted their concerns from an interest in personal space to an interest in public space (Doi, Kii, & Nakanishi, 2008).

2.4.3. Private space

Private spaces refer to an area which is privately owned. It is basically, a private property with the features of exclusive benefit to land owner and rivalrous in nature. See discussion of private goods and private property in Chapter 7.

2.4.4. Cyber space

The internet and the World Wide Web (WWW) together constitute the cyberspace. Cyberspace is "a computer-generated public domain which has no territorial boundaries or physical attributes and is in perpetual use" See (Georgiadou & Groot, 2002; Loader, 1998). Cyber space means the space of interaction formed by the global network of computers that compose the internet Giddens & Griffiths (2006).

The internet is "a global system of connections between computers allowing people to communicate with one another and find information on the World Wide Web (WWW) by virtual, sounds and text in a way that escapes the time and space and the cost, limitations of distance – and also the control of territorial

governments" Giddens & Griffiths (2006). The internet makes it possible to interact with people one has never seen or met before.

Creation of virtual communities on the internet is a common phenomenon in recent times. These virtual communities tend to have purposes ranging from social, cultural, economic, religious and political motivations. This creates a forum for interactivity among millions of internet subscribers and users around the globe using e-mail, facebook, and twitter to mention a few. Where cyber space is used for establishing and maintaining social networks, it could be described as a social space without physical location.

Cyber space also creates an important environment for effective governance through e-governance. By serving as a medium for e-governance, the communication gap between the government and the citizens is bridged in such a way that government policies can be relayed to citizens more easily. And grievances from ordinary citizens can be communicated to government officials in a bottom-up approach allowing for feedback in the process. In spatial planning for instance cyberspace aids in planning application process, appeals and permit approvals.

2.4.5. Social space

Social space includes the network of social relationships formed around a person. The family, work colleagues at the work place, school mates, friends and acquaintances are all part of an individual's social space.

2.4.6. Natural space

Natural space is space which has not yet come under the woodsman's axe, the farmer's plough or the builder's hammer and saw. Natural space can be described as a distinct land use (Guttenberg, 1993).

2.4.7. Living space

Living space refers to the living environment, it is the place where a person lives and works, the streets on which he/she moves to and from work.

2.4.8. Personal space

Personal space refers to "the physical space individuals maintain between themselves and others; it may vary between intimate distance for close relationships, social distance for formal encounters and public distance when confronted by an audience". See Giddens & Griffiths (2006).

[Hall (1969, 1973) as cited by Giddens & Griffiths (2006)] distinguishes four zones of personal space. Hall uses the notion of distance to elaborate on the concept of personal space.

Intimate distance, of up to one and half feet is reserved for very few social contacts. Only those involved in relationships in which regular bodily touching is permitted such as lovers or parents and children operate within this zone of **personal space**.

Personal distance, from one and half to four feet, is the normal spacing for encounters with friends and close acquaintances. Some intimacy of contact is permitted but this tends to be limited.

Social distance, from four to twelve feet, is the zone usually maintained in formal settings such as interviews.

Public distance goes beyond twelve feet. It is preserved by those who are performing to an audience.

"Laws and standards regarding sexual harassment in many western countries seek to protect people's personal space (both men and women) from unwanted touching or contact by others" Giddens & Griffiths (2006).

2.5. Interaction between people and space

Until the recent wave in technological development, people were easily located in space by use of address. The building number, the street number where a person lives, the street name, the administrative boundary and the country name are characteristics of a good address by which a person can be located in space. However, email, the World Wide Web (i.e. cyber space) and especially the increased use of mobile phones has detached people from space. It is easier to reach people from anywhere in the world if they are connected to the internet, and much easier if they own a mobile phone.

Advancement in communication technology facilitates the compression of time and space. In the information age vast amount of information is compressed and transferred digitally across territorial boundaries via the internet. The spread of communication satellites since the beginning of the 1960's has been significant in expanding international communications. Such technological changes 'rearranges' space such that a person can interact with people on another part of the world without moving from his/her chair. The speed of electronic communication alters our experience of time since communication is almost immediate. Instant messaging, email, online communities and chat rooms are typical examples of fast electronic communication. Until recently, communication across space took the form of postage of letters and telegram which required time duration across space before information is delivered. See Giddens & Griffiths (2006).

2.6. Conclusion

Physical space exists in scales and levels. Physical space is an object with measurable dimensions such as height, depth, width, and time. In geo-information science these dimensions are the XY (horizontal position of a point) Z (elevation) and temporal dimension of an object due to changes occurring over time.

We perceive space largely as a physical object which can be modelled by object orientation. Space is also perceived as an emotional and conceptual object. In this thesis we model space as an object where smaller spaces are 'part of' bigger spaces and thus share in its characteristics.

Space has been a subject of great philosophical debates in human effort to understand the world. These debates seem to divide philosophers but on the whole have led to the advancement of scientific knowledge.

Human interaction occurs in space within a time frame in specific places. Spaces become places when people live and work there.

Space is an emotional experience. People make meaning of places because they share experience in those places. [Reininger (1916, p. 29) as cited by Popper (1959)] observes that the absolute (God) is experienced and can be felt intuitively; space is also experience in a similar manner. Space is everywhere, likewise God – the absolute. By this we can conclude that space is similar to what people call God. But space is also time from the philosophical principle of discernable since we cannot find reason to separate space from time then they are one and the same thing. Moreover, space is time and all the physical elements. Space is eternal time (i.e. Eternity).

3. CHAPTER 3: GOVERNANCE IN SPACE

The rationale of this chapter is to zoom in to land space where human's live and interact. Human interaction over the years has led to certain power relations where individuals or a group of individuals are given the mandate to take decisions in the public interest largely because certain issues are beyond the scope of individuals.

3.1. Historical background and context:

Anthropologists assert that humans have lived for most part of history in stateless societies where people lived in autonomous bands and villages. Historically the earliest forms of state emerged whenever it became possible to centralize power in a certain manner. The development of the state concept is strongly tied to the development of society. As population increased and societies progressed in the use of technology for production, literacy and art, the concept of state emerged. Early states were characterized by highly stratified social organizations with a wealthy ruling class that was subordinate to the monarchy where sovereignty of leadership emanates from religious myths.

The ancient state of Mesopotamia emerged as the location of earliest civilization. Mesopotamia is recognized as the world's first literate civilization with written laws. Although ancient state forms existed before the rise of the ancient Greek empire, the Greeks were known to have formulated political philosophy of the state and to have rationally analyzed political institutional forms.

The feudalism state as it is known today describes a political system which was not formally considered as a political system by the people living in medieval period. During the medieval times in Europe the state was based on the tradition of feudalism where the relationship between lords and vassals were central to social organisation. The term "feudal" is derived from the Latin word "feodum" which means an estate in land but it could also mean property which in the feudal state was largely cattle. The feudal state is more a description of the social organisation of the medieval period.

The modern state is characterized by a government ruling with a system of laws, over citizens living within a legally recognized territorial boundary. The government could be dictatorship thus rule of men or a constitutional government (i.e. Rule of Law). A more acceptable form of government in modern state theory is the democratic government which is the system of government based on Rule of Law where power and sovereignty emanates from the people. And this power is usually exercised through universal adult suffrage (the right of all adults (with minor exceptions) to vote in political elections). In most democratic states there is a written constitution containing among others the checks and balances. Separation of power dividing up state power either according to function such as legislature, executive and judiciary or separation of power according to geographical regions such as occurs in federal states. Lord Acton's quote "power tends to corrupt, and absolute power corrupts absolutely" emphasizes the need for separation of state power.

3.2.   Theoretical foundations of the state:

Political scientists have developed theories for the functions of the state and also for the legitimacy of the state institution.

Theories of state function emphases the role of the state in relation to the governed. Pluralists claim that the state is equitably serving the interest of all social groups who are competing for political power. Although pluralists acknowledge the existence of inequalities in society they assert that all organized groups have equal chances to pressure the state. Eventually the will of the group which dominates the electoral process gets implemented. Marxists theorists led by Karl Max in his philosophies clearly stated in the Communist Manifesto claimed that the state is nothing more than "a committee for managing the common affairs of the bourgeoisies". Marxists assert that people in political positions are members of the wealthy upper class and the state exists to serve their interest. The upper class also uses the state as an instrument of domination by virtue of their connections with political leaders and economic elites.

The state autonomy/institutionalism theorists also perceive the state officials have interests of their own which they can and sometimes pursue independently even by imposing their preferences on society. On the other hand state autonomy theorists also believe that the state interest is paramount. They claim that the state is not susceptible to external social and economic influences of individuals and groups.

The anarchist political philosophy advocates for the stateless society; they consider the state as undesirable, unnecessary and harmful to society. As to whether the stateless society is also anarchical as Thomas Hobbes asserts in his writings on social contract is debatable.

The state has the legal mandate to exercise force however this mandate has to be legitimate in some way. Theories of state legitimacy include the divine right of kings, which legitimized the rule of monarchs; the state of nature, which is the political philosophy of the situation of political organisation before the emergence of the state; social contract where the people are said to give up sovereignty to the government in exchange for social order through the Rule of Law; and rational-legal authority where sovereignty is based on the belief that a certain group has been placed in power legally and that the written laws justify their actions.

3.3.   State:

The word "government" is a noun. Government has both singular and plural language usage.
It refers to:

- The governing body of a state.
- The system by which a state or community is governed.
- The action or manner of governing a state, organisation, or people.

Fowler, Fowler, & Sykes (1976)

Generally the government is the administrative body of the state.
The word "state" is a noun which has its origins partly from the Latin word "status".
State means:

- A nation or territory considered as an organized political community under one government

- An organized political community or area forming part of a federal republic such as the states in the United States of America.
- The civil government of a country and
- The pomp and ceremony associated with monarchy or government

Fowler, Fowler, & Sykes (1976)

"A state is a political unit with a territory that the international community treats as independent" Honore'(1995). The most common definition of a 'state' is Max Weber's which states that the state is a compulsory political organisation with a centralized government that maintains a monopoly of the legitimate use of force within a certain territory (Salmon & Imber, 2008).

3.3.1. The state and Legal framework:

The state is the public agency that creates legal frameworks for behaviour in a territory. The legal frameworks of a state are aimed at guiding the processes of production and consumption in a state. Private law, public law including environmental laws and spatial policies are relevant for steering and monitoring the behaviour of individuals and firms in space and time. The state ensures that citizens can use the laws to seek redress instead of assaulting offenders. The laws of the land also regulate the behaviour of citizens in case something goes wrong in the way citizens behave in their production and consumption processes.

3.3.2. Governance:

The word "governance" is akin to "government" and literally means the action or manner of governing. The united Nations describe governance as "the exercise of political, economic, and administrative authority to manage a nation's affairs, including complex set of institutions, systems and processes that engages the state, civil society and the private sector in a democratic and transparent way" Rosenbaum & Bressers (2003).

Generally, governance in public administration is primarily concerned with the rules, understandings and institutions that guide public action, or political action, to implement sustainable public policies (Rosenbaum & Bressers, 2003).

According to Georgiadou & Miscione (2009) governance refers to "the processes, rules and rationalities that affect the way in which power is exercised at different jurisdictional levels, particularly regarding openness, participation, accountability, effectiveness and coherence. Governance processes include: a) Inter-governmental processes, b) Participatory public policy formulation and c) The provision of relevant information services to citizens".

Governance refers to the rules, processes (including participatory decision making) and behaviours of actors (government, public sector, civil society, private sector) that affects the way power is exercised.

The role of government is to establish the rules of the game eg. by making voluntary contracts enforceable. The government steps in when markets fail, including the handling of externalities such as pollution and provision of public goods (eg. national defence). Government may also play a role when the

operation of the market is impeded (eg. by a restricted information flow). Antitrust and price regulations may be employed by government to address issues of market concentration. See Stuart (1977).

Government decision making occurs in scales and levels. The district administration is part of the municipality, which is also part of the province. These administrative units form the state on a higher level of aggregation. Decisions are taken on each of these levels, while the provinces are more concerned with the bigger picture involved in strategic decision making, the municipalities are more concerned about the details of land policy implementation such as land use allocation. For effective decision making reliable and timely information is required by government agency. Technological development in data collection from satellite images and data processing with GIS software is a timely and accurate source of information for government decision making.

Predominant concepts used in policy discourse include equity, efficiency, participation, sustainability, accountability among others. According to Stone (2002) these concepts function as standards against which policies and programmes are assessed. They serve as a yardstick for measuring good governance. Equity and efficiency are political values composed of a more complex set of considerations in public policy formulation and implementation. Stone (2002) used the word 'equality' to "denote sameness and to signify the part of a distribution that contains uniformity" while "efficient allocations of resources are ones that yield the most total value for society from existing resources". Like most values the political values are always contestable. Though everyone supports the idea of "getting the most out of a given input" the challenge arises when it comes to applying the concept to a concrete policy choice especially when assumptions about who gets what counts as important.

3.3.3. Territorial Boundary:

The word 'territory' has its roots from the Latin word 'terra' which means land. Territory is a defined area, including land and water. In relation to the 'state' concept, territory is considered to be the possession of the state delineated by a territorial boundary. The territorial unit can also be described as a place. That is where people feel at home, because that is where they are from, that is where they have their identity, history and culture. See place discussion in Chapter 2.

Topography is useful for determining the boundaries of the state. Topography is the description of a place where we live and move around (ITC Educational Textbook Series, 2009b). Of interest are the land forms, the terrain, elevation, slope, the sea and water bodies, and the vegetation cover of the territory including total area. It is interesting to know the topology of the territory, which country borders the state and the regional and continental location. Generally the spatial properties of the state and issues relating to order, connectivity and adjacency of the three-dimensional geographic object (territory) mean that a topological map of the state can be plotted using GIS applications.

3.4. Society:

The term "society" is akin to the Latin word "societas" which also emerged from "socius" which means companion. The word 'society' is used in different disciplines. It is used in every day language with several connotations. Society refers to the way people are organized.

Human society is basically a large social grouping that shares the same geographical territory and is subject to the same political authority and dominant cultural expectations. Culture is the complex set of values,

beliefs, attitudes, customs and norms that influence how individuals view the world and which governs the individual's behaviour. An individual's values may be based on religious and ethnic background. Societal values may include the rights to life and freedom of speech.

Human societies are characterized by social relations where the basic socialization agent is the family unit. Hence the family transmits culture, history, beliefs and language to members of the family unit. The family was also the first production unit to emerge in society.

Anthropologists and sociologists classify human societies broadly by the society's primary means of subsistence and level of technology. Generally social scientists have identified preindustrial, industrial and post industrial societies based on the level of technological development. Pre-industrial societies are hunting and gathering societies, nomadic pastoral societies and horticulturalists, agricultural and feudal societies.

Societies may also be organized according to the political structure in order of complexity in the type of technology employed in production. There are bands, tribes, chiefdoms, and state societies also corresponding to the stage of societal development.

3.4.1. Civil society:

Civil society refers to citizens and their organizations. Civil society refers to the citizens of a state. The Civil society is the primary locus of political organisation where political identity and ideologies are formed. It is composed of the totality of voluntary civic and social organizations and institutions. Economically, the civil society could be perceived as the consumer base for market products.

People produce and consume in their territorial units. People need goods and services for daily living. These needs are usually met by the private sector. Some goods and services are not readily available to the civil society because the producers do not find it profitable to produce such goods.

People living within a territory may form an association to advance their group interest. Civil society movements have been formed with the aim of protecting the people from externalities produced from industrial activities. These civil societies advocate on issues of common interest giving a voice to the poor, vulnerable and non-human beings who suffer greatly from externalities. And generally advocate for rights and privileges from the welfare state.

Civil societies are increasingly assuming the role of pressure groups exerting influences on government and private sector. For instance Green Peace an International Non-Governmental Organisation is famous for exerting pressure on governments and scientific establishments.

3.5. Economy

The word "economy" has a Greek and Latin origin "oikonomia" ("oikos" means house and "nemein" means management) hence economy can be translated literally as household management. Economy concerns the state of a country or region in terms of the production and consumption of goods and services and the supply of money. Economy is also used in relation to the careful management of available

resources. The term free-market economy is often used to indicate the dominance of the market forces in the state.

3.5.1. Private sector:

Private sector refers to the situation where citizens perceived as production units. Private sector is an economic term referring to the aspect of the economy which is run by private individuals or groups. The private sector is usually organized as sole trader (s), partnership, and limited liability companies with the aim of maximizing profits.

The private sector produces market or private goods for the population. Market goods are consumption goods. The operations of the private sector are legally mandated by the Companies Act which gives registered companies the legal identity to act as legal persons. Thus corporations are mandated to enter into contract, sue and be sued under the legal framework. This also allows the state to collect taxes from private corporations for developmental projects including infrastructure developments.

The private sector also produces waste and pollution in the process of production which destroys aspects of the environment. Unwanted materials are deposited in the environment contaminating water, air and soil with harmful or poisonous substances. "Many of the human activities in production and consumption give rise to waste products to be discharged into the natural environment" Perman, et al.., (2003). In economics these unwanted consequences of economic activity which affects third parties without this being reflected in market prices is called externalities Dorner, Porter, & Metzka (2008).

Figure 1 shows the interactions among the main actors in society, the state as an administrative body, the civil society and the private sector. The private sector interacts with customers and public officers in their day-to-day activities. Civil society on the other hand also forms the market base for market goods provided by the private sector. Civil society as citizens also interacts with the government through participatory democracy at municipal, provincial, and national levels. The state as public sector creates legal frameworks for behaviour of citizens in their various roles as producers and consumers. And the citizens also elect political representatives through democratic elections.
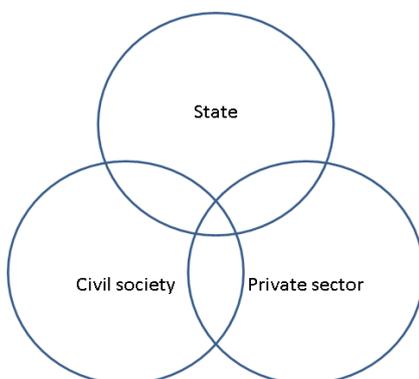
Figure 1: Model of interaction between the state and citizens (as civil society and private sector)

3.6.   Conclusion:

The state needs institutions, public law, and a government with policy instruments in order to function more effectively. Citizens in their various roles as production units and consumers also produce externalities. The externalities produced from productive and consumptive processes damage the environment. A spatial policy instrument tries to balance economic development and environmental protection. Hence, spatial planning might be very useful for steering the behaviour of individuals and firms in space to achieve sustainable development.

4. CHAPTER 4: ENVIRONMENT

The rationale of this chapter is to elaborate on the concept of environment and its relevance to sustaining life on earth. The externalities produced from production and consumption processes destroy aspects of the environment deteriorating the qualities of air, water and soil. People are worried about the environment because they suffer from the pollution of air, water and soil. As a result government legislation and policies such as the environmental law and spatial policies are aimed at protecting the environment from eminent destruction that could result from economic activities in space and time.

4.1. Theoretical foundations of the concept "environment"

There are two broad ethical systems in metaphysical discourse about how people should behave in the context of economic activity and the natural environment with respect to future generations. These schools of thoughts are:

1. the humanist moral philosophy
2. the naturalists moral philosophy

According to the humanist moral philosophy, rights and duties are accorded exclusively to human beings, either as individuals or as communities. And while humans may be willing to give them consideration, non-human beings have no rights or responsibilities in themselves. Thoughts of Immanuel Kent feature prominently in humanist philosophy; one categorical imperative suggested by Immanuel Kent is the principle of respect for persons which states that no person should treat another exclusively as a means to his or her end. Apart from human rights some naturalists also advocate rights for non-human beings. In the period since 1970s a number of important works have emerged which attempt to establish the nature of mankind's obligation to non-human beings.

Libertarianism is a humanist moral philosophy which holds that rights are inherent in individuals and concepts such as community or social rights are not meaningful. They are opposed to the concepts of justice based on outcomes. An outcome cannot in itself be morally good or bad. The libertarians advocate minimal state intervention in market forces of demand and supply; a laissez-faire approach to solving economic and societal problems.

Naturalists on the other hand deny this primacy or exclusivity to human beings. According to naturalists moral philosophy values do not derive exclusively from human beings rather rights can only be defined with respect to some natural system.

Utilitarianism originated in the writings of David Hume (1711-1776) and Jeremy Bentham (1748-1832) and John Stuart Mill (1806-1873). Utilitarianism is a consequentialist theory of moral philosophy. It is solely the consequences or outcomes of an action that determine its moral worth. For utilitarian the ends may justify the means, since motivations for an act or the inherent nature of an action is not relevant. Welfare economics employs criteria derived from utilitarianism. Anthropocentric utilitarianism advocates

that only human beings are morally considerable. In spite the fact that judgments of moral considerability made by humans do not need to be cantered on humans. See Perman, et al.,(2003).

4.2. Historical background and context

The American Heritage dictionary of the English language (1992) defines pollution as "the act or process of polluting or the state of being polluted, especially the contamination of soil, water or the atmosphere by the discharge of harmful substances".

A series of sweeping changes including growth in industrialization following the French revolution of 1789 and emergence of the industrial revolution in Europe gave birth to environmental pollution. As factories burned large quantities of coal and other fossil fuels air pollution became eminent and the discharge of large amount of industrial chemical waste added to the growing quantities of untreated human waste. Prior to this, human societies had experienced a growing level of pollution corresponding to the level technology employed in the production process. Pollution became popularized after the Second World War due to the radioactive fallout from atomic warfare testing.

Environmental science emerged as a response to environmental problems such as air or water pollution. It emerged from public interest in environmental problems with the development of environmentalism and with the creation of a more widely accepted environmental ethic in societies.

The Great Smog of 1952 also had impacts on public policy in London and other countries. DDT was banned in most developed countries after the publication of Rachel Carson's Silent Spring in (1962). The growing evidence of local, national and global pollution and an increasingly informed public gave rise to environmentalism which generally seeks to limit human impact on the natural environment. A trend which calls for public policy interventions aimed at protecting human health from environmental pollutants in air, water and soil.

Environmental policy extends beyond environmental protection and natural resource conservation. Environmental policy comprises a diversity of governmental actions that affect or attempt to affect environmental quality or use of natural resources. By the late 1980s, environmental policy in most nations was seen increasingly as an integral component of efforts to promote sustainable development (Alexander & Fairbridge, 1999).

There is a growing concern that the current economic activity is affecting the environment so as to entail damage to future generations. The 1960s and 1970s were identified as the environmental era, notably because of increasing public concerns about environmental quality and the spate of legislation promulgated by the US congress during that period. These concerns and legislative acts addressed water, air, and aesthetic landscape qualities, outdoor recreation, wilderness, forest and range of resources.

The launch of the first Landsat satellite in the early 1970s coincided with the development of the first environmental policies. And the environmental protection agencies which were eventually established created the initial demand for environmental Earth Observation (EO) products such as maps and other thematic products. The subsequent detection of the ozone hole confirmed the anthropogenic forces (human activity) that pollute the natural environment with chlorofluorocarbons (CFCs). See ITC (2010).

4.3.   The concept 'Environment'

The word "environment" is a noun which literally refers to the surroundings or conditions in which a person, animal, or plant lives or operates.

Albert Einstein is reported to have defined environment as 'everything that isn't me' taking stands on the dilemma of scientists as to whether humans are part of the environment or not. Ecologists however, perceive humans as part of the ecological system.

Notably "the definition of environment includes the circumstances or conditions that surround one (the surroundings); the total circumstances that surround an organism or group of organisms especially the combination of external or extrinsic physical conditions that affect and influence the growth and development of the organism" Environment could also mean the complex of social, cultural and ecological conditions that affects the nature of an individual or community. Environment refers to our surroundings - specifically those that can be perceived (Alexander & Fairbridge, 1999). Perman, et al. (2003) defines the environment as the earth and its atmosphere. Consequently, the environment of an object is the area around it.

4.4.   Environment has a geographical dimension

The earth as a system has four principal components or subsystems. These are the biosphere (life), atmosphere (air), hydrosphere (water), and lithosphere (land); (ITC, 2010). These components are driven by sunlight or radioactivity in the Earth's core. The environment is a thermodynamically closed system (it exchanges energy with its environment). The environment receives inputs of solar radiation (sunlight) some of which is absorbed and drives environmental processes (Perman, et al., 2003).

Uneven distribution of heat over the Earth's surface is responsible for climate, and weather systems and also supports life forms on earth. The global climate system is determined by the balance achieved between energy absorbed and reflected.

Land, air and water components of the System Earth are interesting geographical objects relevance to geo-information and earth observation (EO). Land and water can be observed from sensors onboard a satellite, aircraft or other device. However, atmospheric processes such as scattering and absorption of radiation by gasses and aerosols are also of interest to EO and geo-information science. The qualities of air, water and soil are both observable and measurable thus making it possible to monitor environmental change and the impacts of pollution.

4.5.   The scale of environmental problems:

Anthropogenic activities have influenced the natural processes that form and shape the Earth deregulating them in the process. Climate change is currently one of the most pressing global issues directly related to disturbances of natural systems. Carbon dioxide (CO_2) is the green house gas climate experts are most concerned about because the increased human related CO_2 emissions since the industrial revolution is strongly tied to the current trend of global warming. The Intergovernmental Panel on Climate Change

(IPCC), an inter(national)disciplinary consortium of climate experts, has produced various reports which eventually led to the signing of the Kyoto Protocol, aimed at combating global CO2 emissions.

Environmental issues have many aspects that have to be viewed integrally. Environmental problems have moved from large scale national problem to a global problem. Challenging local environmental problems have global impact with varying degrees of local severity. Local pollution of air, water and soil eventually leads to global pollution. There arises a scale problem where small spatial problems also have become global spatial problems.

Moreover, the cause of ecological problems may occur on one scale and the effects on another a typical example is the problem of downstream pollution caused by agricultural activities upstream. Environmental problems are also linked to droughts, flooding, extreme weather conditions, ozone-layer depletion loss of biodiversity, shortage of water and rising sea levels. Carbon dioxide accumulation in the atmosphere, solid waste accumulation and resource depletion of fossil fuel and other non-renewable minerals are some of the problems that continue to worsen with economic development. See (Dekker, 2003).

4.6.   Free good environment

Environment is freely given by nature and available to both human and non-human beings. It is not scarce and cannot be traded as a commodity on the free market. The environment provides the life sustaining functions including clean air, and fresh water. The environment is also an open resource pool hence more often easily polluted in the process of production and consumption.

Some literature also describes environmental resources as public goods such as the benefits of biodiversity and the services of wilderness resources. Some naturally renewing resource systems also share public goods properties of non-rivalry and non-excludability (Perman, et al., 2003).

4.7.   Conclusion:

Carbon dioxide accumulation in the atmosphere, solid waste accumulation and resource depletion of fossil fuel and other non-renewable minerals are some of the problems that continue to worsen with economic development (Dekker, 2003).

Environmental issues were popularized in the 1960s and 1970s, basically because production conditions were such that producers did not incorporate the costs of environmental damage to production.

Environment is the area which surrounds humans in their productive and consumptive activities. It concerns the quality of what surrounds the places where people live and work. Many environmental resources are public; they concern common resources such as air which is available to all.

Environmental policies, environmental agencies and ministries were set up by states as part of government responsibility to protect the weak, vulnerable and voiceless from pollution. The state responsibility of environmental protection is part of its role in ensuring good governance. The state agency responsible for balancing economic development and environmental protection is the spatial planning. The challenge of

government agencies in ensuring sustainability is a challenge to achieve an appropriate balance between developing natural resources and maintaining optimal natural environment.

And to do effective spatial planning data about the location of economic activity, the type of activity and the environment in which the activities are taking place is essential.

5.   CHAPTER 5: LAND COVER/USE CLASSIFICATION

The rationale of this chapter is that to assess the data requirements of the spatial planner. Data on the location of economic activities, the type of economic activities and the environment in which these activities are occurring in a place in such a way that it reflects the needs of spatial planners. The planner needs to know the activities of people as economic actors and the environment in which they perform these activities. Geo-information science and earth observation becomes extremely relevant for collection, and processing spatial information for spatial planning. This chapter elaborates on these processes.

5.1.   Historical background and context

Several classification systems for classifying land cover and land use have been developed over the years to assist geo-scientists in achieving uniform land cover/use classification. The two separate categories have been mixed consistently in the past years and attempts to disintegrate land cover from land use classes in image classification process have been unsuccessful.

Faculty of Geo-Information Science and Earth Observation of the University of Twente (ITC) adopted the world land use survey "Master key" (LUS-1) prepared by a special World Land Use Commission of the International Geographic Union (IGU) in 1952. In 1972 LUS-2 a refined version of LUS-1 was also adopted by ITC for its better interpretability of satellite images. The Land Use/Cover Classification (LUCC) is the ITC rural land cover/use classification developed since 1981 to provide a basic structure for use in interpreting aerial photos and satellite images adaptable to specific regional conditions. It was developed to allow for consistent differentiation between land use and cover; for application at any scale and for interpreting both satellite images and aerial photos. These capabilities were lacking in the first two types of applications. See (van Gils, Huizing, Kannegieter, & van der Zee, 1991).

Seven main categories have been distinguished in the ITC land cover classification system. These are: Buildings and artifacts, fields/plantation, open natural vegetation, forest, water bodies, snow/ice cover, bare land and burned land. See (van Gils, et al., 1991; van Gils & van Wijngaarden, 1984)

Land use has also been classified as:
Settlement and infrastructure, agriculture, grazing, forestry, conservation, hunting, fishing and gathering, and not used. See (van Gils, et al., 1991).

Currently the LUCC is still being used in ITC, but the land cover/use classifications feature the two categories (land cover and land use) in preliminary and final mapping probably because they are inseparable.

5.2.   Land/Cover and Land Use Classification:

Land cover classification is not the only way to classify space. Within a territory there are sub-spaces thus space can be divided into smaller spaces such as province, municipality and districts. These are

administrative sub-spaces in hierarchy. However, there are other ways of classifying sub-spaces such as thematic classification by topography, classification by land forms, by altitude, by climate and land use among others.

Land cover refers to "the physical coverage of land, usually expressed in terms of vegetation cover or lack of it" and land use refers to "the human use of a piece of land for a certain purpose (such as irrigated agriculture or recreation)" (Chopra & ... [et al.], 2005). Generally land use refers to the human activity or economic function for a specific piece of land. Land use specifies the purpose of the land. Land cover refers to the actual surface material such as grass and water body. The vegetation cover also gives a cue as to the type of economic activity which occurs at a certain place.

5.3.   Data for spatial planning:

This thesis models spatial planning as the spatial policy responsible for balancing economic development and environmental protection. According to this model of spatial planning the planner needs to observe the human activity and the environment as it occurs in time and space. This data requirement for spatial planning is supplied by the land cover/use classification of space.

In the geo-information science world, land cover and land use classification is always important for photo and image interpretation. Image classification is "the process of assigning pixels to nominal, i.e., thematic classes" ITC (2009). Thematic features include land cover, land use, soil type or mineral type. Remote Sensing and GIS experts determine the land cover/use classes from the spectral characteristics of different vegetation types because spectral classes correspond with land cover classes. However, different vegetation types may have different spectral characteristics which pose a challenge when determining the land cover classes. Sometimes one is interested in land use classes rather than land cover classes and sometimes a land use class may comprise several land cover classes.

It is clear that land use determines the cover however land use may influence or completely change the cover characteristics. The dynamic nature of land cover means that land cover change has to be monitored regularly. That is why geo-scientists are interested in land cover change. Over time new pixels which are converted from one class to another may be observed by carrying out time series analysis in GIS applications. Change is interesting because it describes the dynamics of human society. While the land use describes human activity the change detected over time and space describes the dynamics of human activity. The planner is interested in land cover/use class change from 'agriculture' to 'urban' which shows patterns of an urbanizing society. The change in class from 'nature' to 'agriculture' is important to the planner but a more dramatic change from 'nature' to 'bare' sends warning signals for urgent interventions as signs of desertification is looming.

The images alone are not enough to give a holistic view of space. There is also a need for ground data capture to give a complete picture. Data on the measured crop yield, management practices, and the use of pesticides cannot be observed by remote sensing. Similarly, urban dynamics cannot be observed from space such that observable physical changes in the built environment do not fully reflect economic and social processes.

The cover is a sort of biological view while the use is actually an economic view on the earth. The land use classification is actually an economic legend of the cover classes.

Behind the vegetation is human activity where the rural economy is the primary sector while the urban economy is secondary and tertiary sectors indicated in the rural and urban cover classes respectively. Urban economy covers less land as compared to the rural economy where large space is needed. The urban economy is characterized by high economic activity because the urban areas have been shown to provide a basis for high productivity and economic growth rate that exceeds the rural areas. See discussions on primary, secondary and tertiary sectors in Chapter 6.

At the scale 1:100,000 to 1:50,000 we observe the land cover types but when we zoom in to much smaller scales between 1:25,000 and 1:10,000 we begin to see the land use classes. Land cover/use can be classified broadly as Nature, Agriculture, Urban, Road and Water bodies.

The urban land cover/use class in smaller scales can be classified as commercial, residential, industrial, recreational, mixed uses, and streets. The neighbourhood is the smallest planning unit in the urban areas for which the planner would require land cover/use data including socioeconomic and demographic data to plan for streetscapes and land use.

Similarly, the landscape unit is the smallest unit of the rural land cover/use class. Examples of use class in the rural areas are agriculture and conservation. Nature class is a non-use class.

Some land cover/use classes are environmentally very important for conservation because they have a high degree of biodiversity an example is agriculture.

5.4. Spaces have corresponding environment

Each of the land cover/use classes has a corresponding environment because the use class is largely economic which takes place in an environment. The rural areas have rural and nature environments. The urban areas have an urban environment. Roads (transport) and water bodies also have road and water environments respectively. See Figure 2
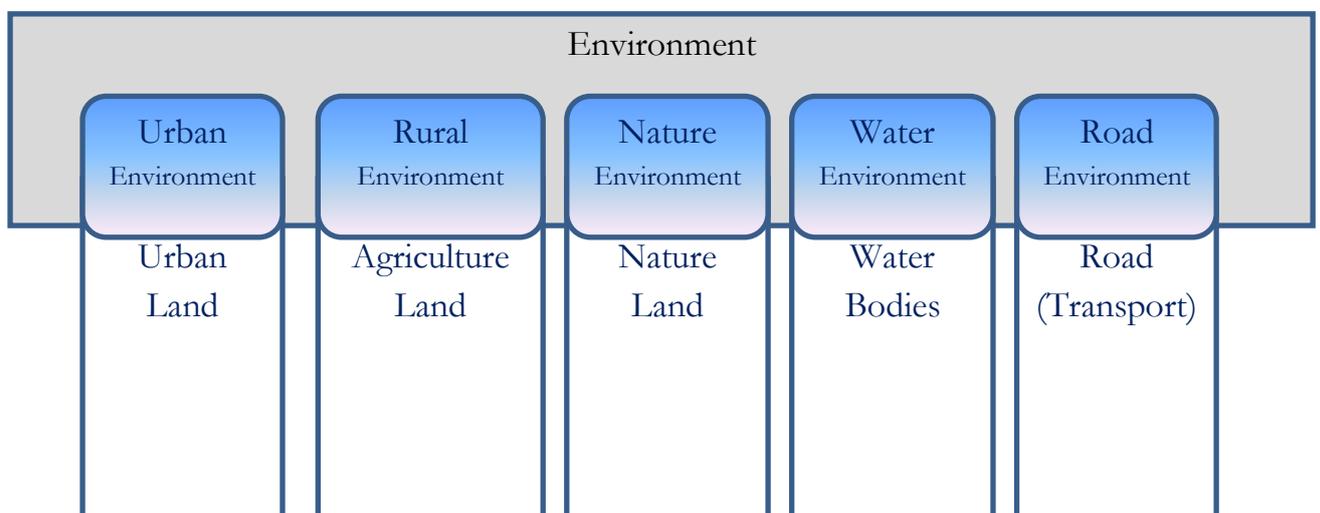

Figure 2: Land use classes with their corresponding environment

Geo-information scientists over the years have inconsistently combined and/or mixed the two separate categories of land cover and land use in their classification (van Gils, et al., 1991). In the frame of the

spatial planning model of this thesis the inconsistency in land cover/use classification is logical. Geo-information scientists combine the cover/use classification in mapping because if the cover is nature then there is no value for use class (conservation). However, wheat is classified as agriculture which is a use class. This classification is logical because depending on the scale certain use/classes may be dominant. For instance if the dominant cover class is nature, it is logical to combine with the less dominant wheat (use class) and vice versa.

The use of economic classification of land use could be necessary because some lands are largely performing economic purposes. In some instances the environmental classification is more appropriate because some lands are basically performing environmental services as in the case of nature conservation.

5.5.　　　Conclusion:

The data needs for spatial planning is provided by the land cover/use classification of space which gives both the economic and environmental view of space. This model of land cover/use classification is relevant for analyzing spatial planning because human activity and environment can both be observed from this type of classification. While the rural cover (nature and agriculture) gives an indication of the rural economy urban cover also portrays the urban economy.

6.   CHAPTER 6: SPATIAL PLANNING

The rational of this chapter is to elaborate on the functions of spatial planning. And to establish that spatial planning has a legal mandate to carry out its functions as a state institution. Once the necessary spatial data is available policy decisions can be made to ensure that development is sustainable, that the environment is conserved and its qualities kept into space and place in time.

6.1.   Spatial planning is a state institution:

The concept of sustainability is promoted in spatial planning across Europe. The idea of sustainable development started developing in the 1970s during which concerns for sustainability began to appear on the international political agenda as international conferences debated on themes such as the interrelationship between poverty, economic development and the state of natural environment.

The concept of sustainability was initially propagated and made popular by the United Nation's World Commission on Environment and Development (WCED) in its well-known Brundtland Report published in 1987. Following the recommendations of the Brundtland Report, United Nation's Conference on Environment and Development (UNCED) was held in Rio de Janeiro in 1992 and is the basis of Agenda 21, the programme for integrating development and environment. Hanley, Shogren, & White (2007) highlights the popularity of the concept in the following quote, "Sustainable development has become a political buzzword since 1992 Rio conference on the environment, organized by the United Nations".

The United Nations Commission on Sustainable Development (UNCSD) established as a result of UNCED in 1992, organised the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg to build on the achievement of UNCED.

Sustainable development refers to "Development that meets the need of present generations without compromising the ability of future generations to meet their own needs" (WCED, 1987). Sustainable development in simple terms refers to "growth that does not damage the environment". Sustainability problem deals with issues of equity. It is about "how to alleviate poverty in ways that do not affect the natural environment such that future economic prospects suffer" (Perman, et al., 2003).

The European Regional/ Spatial Planning Charter adopted in 1983 by the European Conference of Ministers responsible for Regional Planning (CEMAT) is one of the earliest policy intervention in Europe. The Charter is often known as Terremolinos Charter. Several other policy documents have since been signed by European countries including the European Spatial Development Perspectives (ESDP) in 1999. Spatial planning in Europe has been heavily influenced by policy initiatives in the EU level where coordination of EU sectoral policies is high on the political agenda. The state employs certain methods through the public sector to influence land use decisions considering the trade-offs that have to be made between the environment and economic development of a place. Economic development and environmental protection are totally opposite. There is a need for one policy which will balance these two extremes. Spatial policy is mainly implemented through the public sector in spatial planning.

6.2. The concept "Spatial planning"

Spatial planning is also called land use regulation or zoning. Spatial planning involves land use planning or physical planning; "the process of allocating resources, particularly land, in order to achieve maximum efficiency while respecting the nature of environment and the welfare of community" (UN/ECE, 1996). Land use planning is also defined as "the tentative process based on the dialogue between all the actors involved, in order to gain commitment to decisions on the sustainable use of land and the initiation and support of the corresponding measures for implementation" (de Haas & Meyer-Rühen, 1998). According to Needham (2006) "land use planning is no more than the actions taken by a state agency to realize the ambitions which it adopts for the land use in a particular location".

Albrechts (2004) defines spatial planning as a "Public-sector led, socio-spatial process whereby a vision, actions and the means of implementation are produced that shape and frame what a place is and may become". Spatial planning determines how makeable a specific space should be; by translating land use plans into guidelines designed to influence the implementation of projects. The land use plans contain blue prints of how an area is supposed to be developed.

Conceptually the role of spatial planning as government agency can be perceived in the model below (figure 3). Spatial planning is concerned with allocating land resources (infrastructure) in space to facilitate development. However, due to the negative externalities produced from human activity spatial planning manages the impact of production and consumption for sustainability reasons. Hence the need for land use restrictions to balance development and environmental protection for sustainable development.

Spatial Planning Model
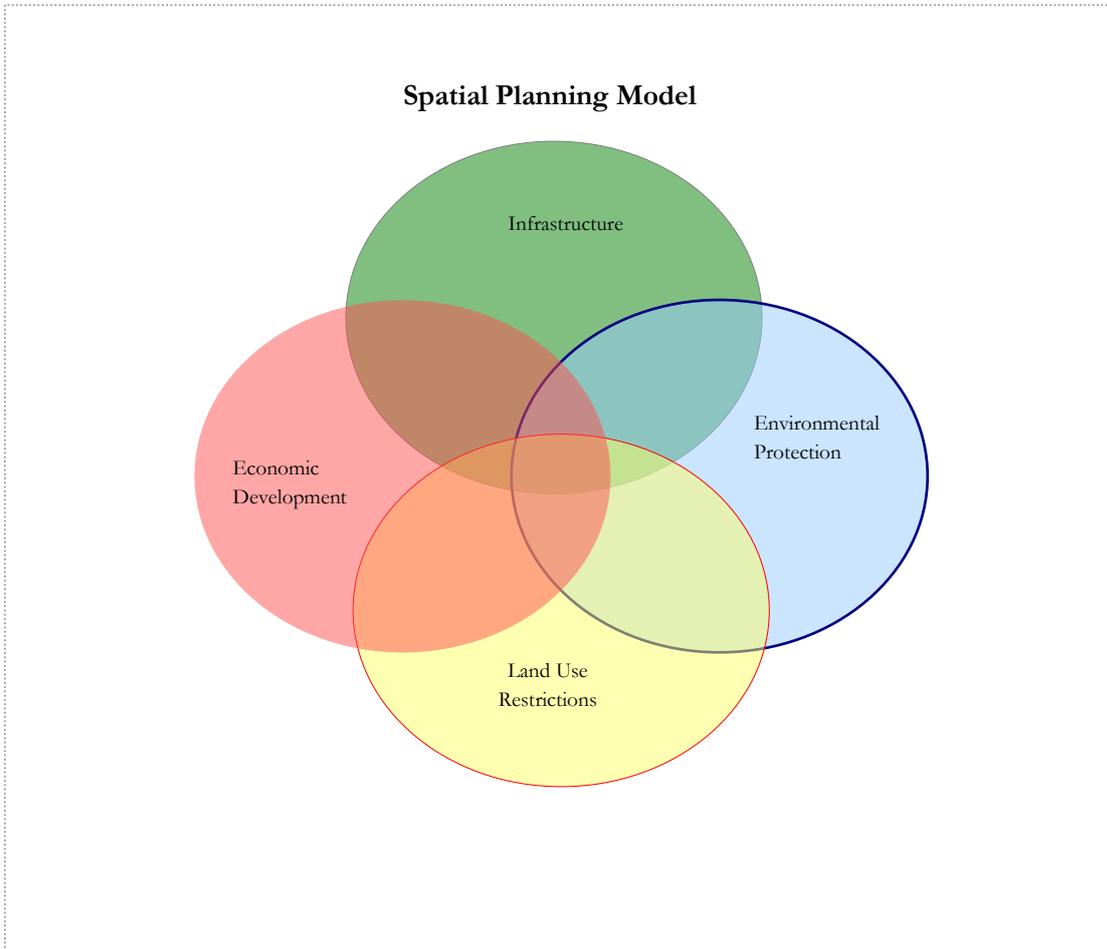
Figure 3: Conceptual Framework

6.3. Planning economic development and restrictions in space:

The sub-spaces have specific economic and environmental characteristics which can be observed from space by remote sensing. Economic and social process cannot be observed by remote sensing. Socioeconomic data can be obtained from macro and macro economic data; and qualities of air, water and soil can also be measured. Generally, environmental protection involves land use restrictions while economic development planning involves building infrastructure to stimulate the economy.

Spatial planning involves balancing two extremes, economic development and environmental protection. In each of the sub-spaces there is a spatial policy aimed at balancing the land use and conservation thus economic development and environmental protection. The aim of the spatial policy is to steer what people do in space and time.

6.3.1. Primary sector:

The primary sector is comprised of agriculture, forestry, mining, and aqua culture. It is land based as large areas are used for production. The primary sector depends heavily on access to land resources. Production in this sector also involves the exploitation of natural resources as raw materials for industry or products ready for market.

One of the important system functions at the earth's surface is agriculture, which can be seen as a result of human influences on natural process (ITC, 2010). Food production depends heavily on natural resources such as land and water resources. Water cycles and energy systems interact with the environment in such a way that rain water is available for agriculture.

Changes in rain patterns and water cycles affect agriculture. Impacts of global warming on global food production cannot be over emphasized. As draught seasons prolong unduly, while rain seasons delay consistently the long term effect on food security becomes profound. Annual crops such as cereals and grains tend to be affected more than perennial crops.

The agricultural environment is prone to chemical pollution from farming activities. Higher food production can be achieved in a sustainable way. As observed by Dekker (2003) sustainable food production " … implies that the level of food production does not lead to overexploitation of the available natural resources or use of extensive fertilizers that will eventually destroy the quantity of the water that is also used for irrigation."

6.3.1.1. Agriculture Planning:

Agriculture Development Planning involves stimulating the agriculture production by building road infrastructure for conveying farm produce to the market or to the urban areas for processing. Agriculture also stimulates certain nature values such as biodiversity.

Mining can be destructive to the environment. Agriculture can also be destructive to the environment when harmful chemicals such as DDT are used. Tree felling and the use of heavy machinery may destroy biodiversity and landscapes. Planning environmental protection in agriculture areas involves the use of land use restriction which means that negotiations on acceptable restrictions have to be reached with the farmers. The purpose is mainly to ultimately maintain the environmental values in the exploitation of natural resources.

6.3.1.2. Nature Planning:

Planning for nature is called conservation planning. The nature land is delineated and given a legal status. The resources can be protected by restricting access and regulating the kind of uses that take place in the conserved area. The aim of nature planning is to protect the environment which is not threatened by human activity so that environmental qualities can be conserved and preserved because of the environmental services those areas provide for human and non-human beings. In nature planning the aim of planning is to disallow economic development in the conserved areas.

6.3.2. Secondary and tertiary sectors:

The secondary and tertiary sectors involve the production of industrial goods and services. While industry requires machinery and technology for high productivity, specialized skills are needed for successful service provision. The secondary and tertiary sectors depend less on land resources and are located mainly

in the urban areas. The increasing importance and entrenchment of the service industry in recent information age terribly weakens the over reliance of production on land.

6.3.2.1. Urban (Spatial) Planning:

Urban planning is a dynamic process which involves change because the urban society is dynamic in its spatial behaviour. These dynamics also occurs in their socio-economic features for which the state has an equity problem to solve. Road infrastructure is built between urban areas to stimulate the economy. The roads usually link the administrative regions however; streets are also built to facilitate easy movement from one community to the other.

Production and consumption behaviours in the urban areas also produce externalities which destroys aspects of the urban environment. Air, water and soil pollution is prevalent in urban areas because of industrial pollution and human waste from increasing urban population. Environmental planning involves regulations to control emissions to air, water and soil, waste management, and land use restrictions such as building height limitation and by not mixing land uses in the same area. The idea is to create the conditions under which certain environmental qualities will result. Restrictions in urban areas are aimed at producing spatial qualities for the spatial object neighbourhood.

The urban social environment is concerned with safety, greenery, aesthetics, generally the quality of public spaces and places where human interaction occurs.

6.3.2.2. Road (Transport) Planning:

Road Planning involves decisions about what type of road should be built and where. The road infrastructure stimulates economic development of the state, provinces, and municipalities. The purpose of road planning is to link administrative regions and also boost agriculture, manufacturing and service economies for development. Of interest is the connection between urban areas and rural areas where farm produce are transported to urban areas for processing and consumption.

Roads also produce externalities such as noise which could deteriorate the environment. Smoke and fumes from cars are also harmful to the environment.

A road connection could also harm biodiversity if the routes go through forests and landscapes. The environmental impact assessment carried out before the commencement of the road project is useful for determining its feasibility. A project that has a high cost to the environment may not be implemented or other alternatives which will have less environmental impact may be considered.

6.3.2.3. Water Planning:

Water is a very important resource. All forms of life need water for survival. Fresh water is used for drinking and for other household chores. Water sources include rivers, lakes and sub surface water and well borne water. However, water is one of the main mediums of pollution. Liquid and solid waste are dumped in water bodies and transported to other places.

Water planning involves restricting access and use of the resource by creating buffer areas around it. Economy can also be stimulated when water is used for fishing, transportation and recreational purposes.

6.4.   Land cover/use and institutional setting

Land use has an institutional reflection. Governments classify sub-spaces under specific ministries. And the use classes are organised at a government level in ministries that support that use class. Therefore, the cover classes also correspond to institutional settings and ministries.

In the Dutch case, Ministry of Agriculture, Ministry of Housing, Ministry of Transport and Public Works, Ministry of Environment support agriculture, urban, roads and nature land use classes respectively. Moreover, there are dominant economic users behind the cover who are supported by the ministries such as the farmer for agricultural and landowners/users of urban neighbourhoods. And each sector also has sectoral policies eg. Housing policy, agriculture policy, urbanisation policy etc.

The ministries make sectoral plans with details of projects the sector plans to carry out for a specific period. The projects are normally infrastructure project. In the Dutch case for instance Ministry of Transport and Public Works may have plans for extending road networks. Environmental Impact Assessment and a Spatial Impact Assessment are then carried out before approval is given to sector plans. Sectoral plans have to be integrated thus the development initiatives have to be coordinated effectively.

The integration of sectoral plans is done through spatial planning. Integration of plans and spatial data considers both vertical and horizontal integration. Vertical integration involves aliening development initiatives between various levels of government while horizontal integration coordination of plans between agencies or organisations operating at the same level. The integration process also involves spatial matching of all claims from the various sectors. There are claims that have to be matched in space. In the Dutch case, spatial planning as a state agency is located in the Ministry of Housing and Environment. Spatial matching of sectoral plans is done in three levels: national, provincial and municipal levels.

6.5.   Conclusion:

Spatial planning is institutionalized in many countries. The planner plans roads in agricultural areas for transporting produce to the market. Roads are also planned for urban areas. Hence public goods are provided in rural and urban areas to stimulate the economy.

Land based infrastructure is provided on public land i.e. land owned by the state. Land based infrastructure also produces externalities such as noise which disturbs aspects of the environment. And sometime state infrastructural project affects ecosystems and biodiversity when the road or train route passes through the forest areas.

Spatial planning stimulates the economy by allocating land based infrastructure. And spatial quality is also produced as the environment is protected largely by restricting productive and consumptive behaviours on private land.

7.   CHAPTER 7: PUBLIC GOODS

The rationale of the chapter is to link spatial planning to economic concepts of public goods. State provided public goods and functions of spatial planning from public administration perspective are elaborated.

7.1.   Public Goods:

Samuelson (1954) is usually credited as the first economists to develop the theory of public goods. According to Samuelson (1954) public good is a "collective consumption good". Public goods have the characteristics of non-excludability and non-rivalry. Public goods are non-excludable because non-payers (free riders) cannot be excluded from consuming public goods. Non-rivalry means an individual's enjoyment of the good does not reduce or exhaust the good's utility for other people.

Public good refers to a good or service in which the benefit received by any one party does not diminish the availability of the benefits to others, and where access to the good cannot be restricted (Chopra & ... [et al.], 2005). A public good "is something which is produced, which is valued, but which the producer cannot easily sell, because she cannot easily or commercially exclude non-payers from consuming the good or service" (Needham, 2006). Thus certain goods and services are not provided by the market because it is either not profitable for entrepreneurs or that such goods cannot be traded as commodities on the market where those who cannot afford it are excluded.

Goods	Rivalrous	Non-Rivalrous
Excludable	Private Goods	Club Goods
Non- Excludable	Common Goods	Collective/Public Goods

Table 1: Types of goods

Other economic concepts relevant to understanding public goods as shown in Table 1 are discussed below:

Private goods:

In a functional free market system, the forces of demand and supply for goods and services determine the market price at which they are sold. Goods which are in high demand as well as goods in short supply

tends to have high market prices. While good in low demand or goods with high supply attract low market prices. In such a situation the market price is a function of the quantity demanded by the public or quantity supplied by the private sector. The kind of transaction which takes place under the market conditions transfers the rights of ownership of goods from the seller to the buyer. The good is then considered as a private good. Thus the buyer acquires the exclusive rights to benefit and completely exhaust the good's utility.

Additionally, private goods are also rival in consumption thus an individual's enjoyment of the good reduces or completely exhausts the good's utility for other people. Private goods are excludable and rivalrous thus the purchaser is the sole beneficiary of the goods and all others are excluded from enjoying the goods. Examples of private goods include items which can be exchanged for money in the market such as food and clothing.

However, the use of private goods may also generate public spill over effects which can contribute to or spoil the availability of public goods (Georgiadou & Groot, 2002; Needham, 2006). For instance noise made from a neighbour may disturb the calm in the whole community.

Free goods:

Free good refers to goods which are not paid for. Nature, the environment, rain, sunshine and air are examples of free goods. They often have the characteristics of non-excludability and non-rivalry. Thus a free good is also a public good although free goods may exist even in the absence of a public. For instance it does not only rain in places where people live and work. It also rains in uninhabited places such as the forest.

Merit good
Merit good are goods that are monumental. It feels right for a nation to have a national museum for displaying the national cultural artifacts and heroes. Merit goods are usually located in the cities and people incur transaction costs to enjoy merit goods. Examples of merit goods include historic sites, and museums.

Collective good refers to goods owned by a group of persons. This could be a family, clan or community. Sometimes state properties are classified in this category. The collective good has the properties of non-excludability and non-rivalry to the group members.

Club good requires membership of some form to enjoy this kind of good. Club goods have the characteristics of non rivalry, but non-members are excluded from benefiting from the goods.

7.2.   The New public goods:

"Global public goods are public goods whose benefits reach across borders, generations and population groups. They form part of the broader group of international public goods, which include as another sub-group, regional public goods"(Kaul, 2000). The theory of public goods has underpinned much of the recent literature about international and global environmental problems. Even though researchers have critiqued the application of public goods theory to the global context, the global effects of national developmental policies tends to have global impact. See Georgiadou & Groot (2002) for an extensive discussion of most recent critique.

The concept and theory of public goods is applied at the global level due to the increasing global impact of national policies. Moreover, the level of environmental cost borne or benefit received by citizen of one country does not depend only on that country's action but also depends on the actions of other countries. See Perman, et al., (2003).

"A striking feature of many of today's major policy challenges is that they are global. They potentially affect us all whether we are rich or poor, from an industrial or developing country" Kaul (2010).

Interestingly, when the existence of a problem is widely agreed by national governments, agreement on the nature of appropriate policy response is limited. And national governments are reluctant to incur costs associated with policy responses and agreed action is even more difficult to realize than the agreement on what should be done (Perman, et al., 2003).

Of importance is the increased possibility of regional and global peace due to cross border cooperation. Regional cooperation may even seek to give citizens of all member states common rights of citizenship as is the case in EU countries. As once rigid geographic borders become relaxed or even invisible, regional peace is fostered through such integration. Peace and security then becomes a public good enjoyed by member states.

Examples of global environmental challenges include global warming, ozone-layer depletion, biodiversity, loss control of infectious diseases, CO2 emissions and terrorism which require the cooperation of other nations. These global issues are given priority at the UN, EU and other regional groupings.

Following the new role of the state is also new responsibility; responsibility not only for its citizens but also for its neighbouring states and the world at large. The principle of responsible sovereignty becomes a key concept which encompasses both internal and external dimensions of state responsibility. "The state responsibility is to ensure that other nations are not being unduly harmed by spill overs form their jurisdiction that they could reasonably be expected to internalize" (Kaul, 2010).

7.3.   State provided Public Goods:

Public administrative view of public goods is that public goods have to be state provided. Public goods refer to goods and services provided by the public sector. The state and public agencies are responsible for providing public goods and services which are not supplied by the open markets. The markets may find it unprofitable to produce public goods. Sometimes goods that can be produced by the markets are not allowed for equity and control reasons. The government intervenes in the interest of the public to stop the possible abuse of monopoly power and to avoid the exclusion of the poor and vulnerable from accessing basic services such as water, electricity and heating.

The state provides those things which the market does not provide such as the roads, schools, and defence. The state intervention seeks to stimulate the economy by providing public goods. The state is also mandated to protect private property and investments stimulating the economy for increased economic activity.

However, the state also has a public administrative mandate of ensuring the welfare and security of its citizens such as protection against disasters. The state is also concerned about environmental protection

from externalities that may be produced from the land based public goods. Public infrastructure should not destroy spatial qualities at the lower level of spatial aggregation.

7.4.   Legal perspective of public goods:

Ownership of private land rights are managed by state legislation on private property rights of owners enshrined in the private law. A property system which manages land ownership in such a way that, the community recognizes the land rights of persons over certain pieces of land could take the form of private property, common property, collective property and no property rights regimes. See (Waldron, 1985). Land owners have a recognized claim on a piece of land because they hold ownership rights which permit them to exclude others from benefiting from it.

The private property right of individual landowners confers on them the rights to use, transfer, dispose, and sell, depending on the jurisdictional constraints of the state.

The ownership and use of land is however controlled by the system of government. In some countries, state has ownership of all land and only issues 'use rights' to citizens and developers. Tenure systems differ from one country to the other. A secure land tenure system confers the rights in land to persons in such a manner that their land cannot be taken away from them without their legal consent.

Property regimes comprise private property, common property, collective property and no property rights regimes.

Open access (No property rights): Legally every piece of land has an owner. The era where tribes and groups invade unoccupied land and claim ownership has phased-out, with the hunting and gathering phase in the development of human society. In modern society land which can be accessed by all persons may take the form of public spaces. Of interest is that the users of public spaces have the rights of use because they contribute to the development of their community by paying taxes. Again, air a resource freely given by nature has no property regime since it cannot be accessed and controlled by any person or group of persons.

There are other examples of open access regime which fall outside the scope of this thesis some of which are knowledge, information, medical treatment and some scientific research findings.

Private property: "A private property system is one in which the correlation between individuals and objects (resources) is used as a basis for solving the problems of allocation" Waldron (1985). A private property right confers exclusive rights to the owner. Similarly, Honore' (1995) also argues that exclusive right to land qualifies that piece of land as property.

In a private property system there are rules governing access to and control of material resources. Legally, only owners have the right or access, rights of use, right of transfer and rights of sale. These bundles of rights listed are not exhaustive. One of the advantages of conferring rights to land is that it increases people's sense of security, by recognizing and protecting their land rights. This sense of security also increases their commitment to invest in the land.

Common property: According to Waldron (1985) in a system of common property, rules governing access to and control of material resources are organized on the basis that each resource is in principle available for the use of every member alike.

No member of the community has exclusive rights to access, control and use the land neither does the community as a group. Hence the same resource can be shared by persons who are passing by. The use of common land resources leads to what Hardin (1968) calls "Tragedy of the commons".

Collective Property: material resources are answerable to the needs and purposes of society as a whole, whatever they are and however they are determined, rather than to the needs and purposes of particular individuals considered on their own.

Whereas common property does not have a management group, collective property regime does. The absence of management group with rights forms the basis of "Tragedy of the commons" Hardin (1968); indeed there is a tragedy because there is no management group in common property regime.

"Common property regime is similar to Collective property regime to the extent that no individual stands in a specially privileged situation with regard to any resource. But it is different inasmuch as the interests of the collective have no special status either" Waldron (1985).

7.5.   Land rights:

In Public Administration, public land is land owned by the state (Zimmermann, 2008). The state builds public goods on public land. However, the state has no legal control over private land.

Private land owners possess a bundle of rights that accompanies land ownership. These include the right to access, the right to transfer land, the right to inherit land, and the right to harvest fruit from land. These rights can be held by different persons as part of the ownership right of a person or group to land. The landowner is the person who has the best right to control the thing in the long run, though in the short run someone else may have a more immediate right to it. (Honore', 1995)

Legally exclusive rights to land confer on the right holder, the "Usus", "Usus fractus" and "Abusus" rights. Thus the right to use and control the land, the right to make gains from it and the right to alienate, transfer and split the land to another person. To enjoy exclusive rights, other persons have a legal duty to permit the land owner to exercise his/her right to the land.

However, when it comes to protection of private capital and producing spatial qualities in places where people have private property rights then the state has to act based on the consent and cooperation of land owners/users. Participation or negotiation becomes an important element when dealing with private land owners/users.

Interestingly, land parcels in a neighbourhood are separated by a boundary. This creates a spatial layout where one parcel is next to another and an adjacent land use affects the neighbours. The state intervention prevents the nuisance that could result by not restricting production and consumption behaviours of land owners/users.

7.6.   Conclusion:

The provision of public goods is actually what the planners do when they allocate infrastructure. However, when restrictions produce spatial qualities as the environment is being protected from externalities; the restriction can be perceived as a public good because it is state provided.

Where restrictions have to be placed on private land such as building height limitation, regulation of noise levels, among others then private land rights may be affected thus the need for negotiating acceptable restriction with land owners/users.

8. CHAPTER 8: SPATIAL QUALITY

The rationale of this chapter is to elaborate on the production of spatial qualities through negotiation of acceptable land use restrictions on private land.

8.1. Historical background and context

Spatial quality has both an aesthetic history and a political history. The political history is strongly tied to the Dutch spatial planning policies.

8.1.1. Aesthetic history

The appreciation of and the affection for beautiful environment is linked to the emergence of organized societies. In early civilizations, Egyptian dynasties served as places meant to evoke aesthetic experiences among viewers. The Greeks and Romans developed some kind of formal principles that related environmental conditions to aesthetic consequences. The Chinese also constructed highly sophisticated gardens on the basis of aesthetic principles. Modern notions of aesthetics emerged strongly during the Renaissance which ultimately led to the formal artistic appreciation, description and evaluation of landscapes. See Alexander & Fairbridge (1999).

In aesthetics the word "environment" is used interchangeably with "landscape".

Environmental aesthetics is defined broadly as the interaction between an individual and the environment, in relation to beauty. According to Alexander & Fairbridge (1999) any definition of environmental aesthetics should include both the environment and the human experience of it that give rise to a class of aesthetic experience.

8.1.2. Political history

The historic root of spatial quality in the Dutch case extends beyond aesthetics. Spatial quality is a new concept. The concept of spatial quality is a political concept largely found in the Dutch policy documents. The use of spatial quality in Dutch policy documents is a recent development. Spatial quality in the Netherlands is considered as the main goal of spatial policy. Since the Vierde Nota over de Ruimtelijke Ordening (the fourth note concerning spatial planning also refers to the fourth Dutch National Spatial Planning Policy) (1993), the concept spatial quality is used as policy goal for areas (Assink & Groenendijk, 2009).

In the Netherlands, spatial planning is normally carried out in three levels: national, provincial and municipal levels. The role of higher level policies and strategic plans is to provide guidance to provincial and municipal level plans. The fourth Dutch National Spatial Planning Policy provides guidance to

provincial plans. Spatial quality is used in provincial and municipal plans as a policy objective and it is more dominant in municipal plans as a policy vision.

To achieve spatial quality of a landscape for instance, the landscape is assumed to have a 'base quality' which has to be maintained or improved. The 'base quality' refers to the status quo; it is the minimum quality of the landscape which should not be destroyed. In areas where the base quality is perceived as being under pressure, 'improvements' have to be made by targeting policy in that area in such a way that the 'base quality' is protected and enhanced. This may require a reduction in the number of economic facilities, tourism and other uses which may exert pressure on the 'base quality' of the landscape in rural areas. In urban areas space is allocated to accommodate growing cities however, 'base quality' of rural and urban areas is not operationalised in the policy documents.

8.2.   Dimensions of spatial quality:

Assink & Groenendijk (2009) have operationalise the concept of spatial quality as used in the Dutch policy documents by identifying three components of spatial quality developed around three aspects or values. These are the use value, the perception value and the future value. "The use value occurs when space can be used in a safe manner for several purposes (to live, to work, but also to recreate and to move through). The idea is that these different functions do not hinder and probably reinforce each other. The perception value plays an important role in people's living environment. Cultural awareness and diversity, the presence of characteristic property (identity) and of history and beauty. Perception value also includes spatial diversity and variation. Future value includes characteristics such as sustainability, biodiversity, robustness and flexibility both concerning suitability for new use forms and admissibility for new cultural and economic meanings" (ibid).

8.3.   Spatial quality has a geographical dimension:

The free good environment at a lower level is termed spatial qualities. Spatial quality is environment on the smaller scale. Spatial qualities have measurable dimensions. Spatial qualities are concerned with the area where there is economic development on one hand and environmental protection on the other hand. Spatial quality is about the smallest planning units. Spatial quality is largely concerned with the quality of neighbourhoods in urban areas and landscape units in rural areas. Spatial qualities can be attached to landscape unit such as nature, agriculture, water body, with land surrounding it. Spatial quality of a neighbourhood is achieved by restricting land use.

8.4.   Negotiation as tool for producing spatial quality:

To obtain spatial qualities at the neighbourhood level, the planner has to negotiate with lower level partners to produce the neighbourhood quality. When we zoom-in to lower level urban areas such as industrial, residential, and mixed uses these lower level spatial objects obtain spatial quality attributes. The spatial qualities of these spatial objects are tied to the negotiated agreements with land owners/users.

In producing spatial qualities, two kinds of arrangements are made:

1. Arranging spatial quality of public space
2. Arranging spatial quality of private space by restricting land use

8.4.1. Spatial quality of public space:

Public management of infrastructure is important for the production of spatial qualities. Infrastructure is provided on public land. This leaves the maintenance of such public lands as a responsibility of the municipality as the public agency responsible for management of the neighbourhood. The municipality also provides public services such as collection of sewerage, beautification and landscape management, streetlights, safety, security, tranquillity, provision of plumbing facilities and other public facilities. Arranging physical space in urban areas concerns the layout of public space though this might not be required in producing spatial quality of landscape units. Since neighbourhood is a combination of streetscapes and private space, the spatial quality of the neighbourhood is composed of the quality of streetscapes and the quality of private space.

Participation endows responsibility on land owners and land users for the maintenance of public space. By identifying with the neighbourhood the land owners/users tend to feel more responsible for the public space.

8.4.2. Spatial quality of private space achieved by restricting use:

Land ownership confers on land owners' the ownership rights. The public sector has no control over the private space. However, the public sector has to facilitate the production of spatial quality in the private space; this means private land rights will be affected by land use restrictions. Hence the need to negotiations with land owners/users aimed at establishing acceptable restrictions which will be beneficial to the entire neighbourhood. Spatial quality depends on the private arrangements of private land owners/users in their production and consumption behaviours. The market arrangement takes the form of a legally binding contract among landowners.

In the production of spatial qualities the private property rights of landowners are involved and land owners/users will be willing to accept restrictions if the benefits outweigh the costs. Private land owners/users accept the restriction as producing a positive externality for the higher level spatial object neighbourhood not just for their parcel per se. Because in the end the individual parcels inherit the spatial quality of the neighbourhood.

Productive and consumptive behaviours have to be arranged by negotiating acceptable restrictions with individual land owners/users and firms. If production is environmentally risky for instance when industry emits carbon dioxide into the environment, government interventions may be required to control the level of carbon emission. On the other hand, consumption may also produce disturbance to the environment and to neighbouring land uses. Excessive heating and noise are some examples of consumptive behaviour that could negatively affect the environment.

Spatial quality may be sensitive to private land use. Spatial quality is highly sensitive if violations by one land owner/user in the neighbourhood negatively impacts on the quality depriving other land owners of

enjoying the benefits of the serene environment. For example if all landowners in a neighbourhood agree not to make noise after 9pm, the landowner who violates this agreement by playing loud music after the stipulated time deprives other landowners from enjoying their property. In this respect spatial quality is said to be a function of the sum of individual behaviours.

In the end zoning or land use restriction seeks to achieve the objective of preventing commercial or industrial activities from locating in residential areas and creating noise and pollution, to avoid congestion, to provide environmental benefits such as green space, and to preserve historical sites, views, and neighbourhoods and to avoid negative externalities from land use. See Deininger (2003).

In view of the fact that there is limited literature on spatial quality, we attempt to define this complex terminology.

8.4.3. Definition of Spatial Quality

Spatial quality is an aggregation of individual experiences of people in a place. It is the experience in a certain place at a certain time. It concerns the perceptions of people; the way people think and feel about a place based on their personal experience or the experiences of others.

8.5. Conclusion:

Spatial quality could be perceived as a pure public good because its provision is both non-rival and non-excludable. Non-rival means that spatial quality benefited by one landowner does not reduce the level of spatial quality available to other land owners/users in the neighbourhood. Spatial quality is non-excludable because it is impossible to exclude anyone from benefiting from it once it has been produced. Spatial quality is enjoyed by the land owners/users in the neighbourhood but passers-by cannot be prevented from benefiting. Spatial quality also has the characteristics of collective and common goods; it could also be perceived as a free good by passers-by.

The process of producing spatial quality is interesting because a quality is created as a result of restriction on private property. The neighbourhood quality created in the urban areas can be perceived as an environmental good which is largely a free good but since it is created through public intervention in the form of land use restrictions, it becomes a category of state provided public good. This is because the land use restriction is state provided. Spatial quality of urban areas is created through the combination of land use restriction on private land and public management of infrastructure in the urban areas.

Spatial planning deals with individuals and firms located in places. And the impact of their productive and consumptive behaviours on the environment in order not to pollute and destroy it; thus enabling sustainable development. An individual, local action is employed to solve global environmental problems. "Think global, act local" is also valid for mitigating the impact of local productive and consumptive behaviours on the global environment.

The restrictions could also be beneficial in economic terms such as increased property values resulting from spatial quality of the neighbourhood.

In conclusion spatial planning is the process of locating public goods in space. There are two types of public goods allocation in spatial planning:

1. The land based delivery of spatial goods (which are basically infrastructural development).
2. Spatial quality (which involves the negotiation of restriction on private land for the provision of public goods).

Figure 4 shows the interaction between urban areas and rural areas as road networks always connect administrative regions for easy mobility and transportation of goods from the rural economy (areas) to urban and from urban to urban economies (areas). The impact of state intervention (as indicated by the arrows) is aimed at environmental protection and economic development in both rural and urban areas.
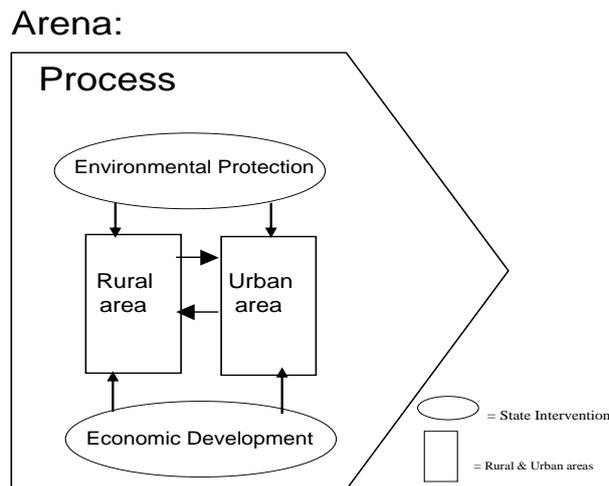
Arena:

Process

Environmental Protection

Rural area

Urban area

Economic Development

○ = State Intervention

□ = Rural & Urban areas

Figure 4: Spatial Planning Process - state intervention in space

Figures 5 shows a process model of spatial planning where data obtained from remote sensing (land cover/use classification), ground data, socio-economic data, political ideology and interests of the government, interests of organised groups and global issues are inputs in the planning process. In the end spatial planning seeks to allocate land based resources (infrastructure) and restrict land uses producing spatial quality in the process. Thus spatial planning process is all about allocating state provided public goods. The arrows show the flow of inputs to the process and outputs from the process.
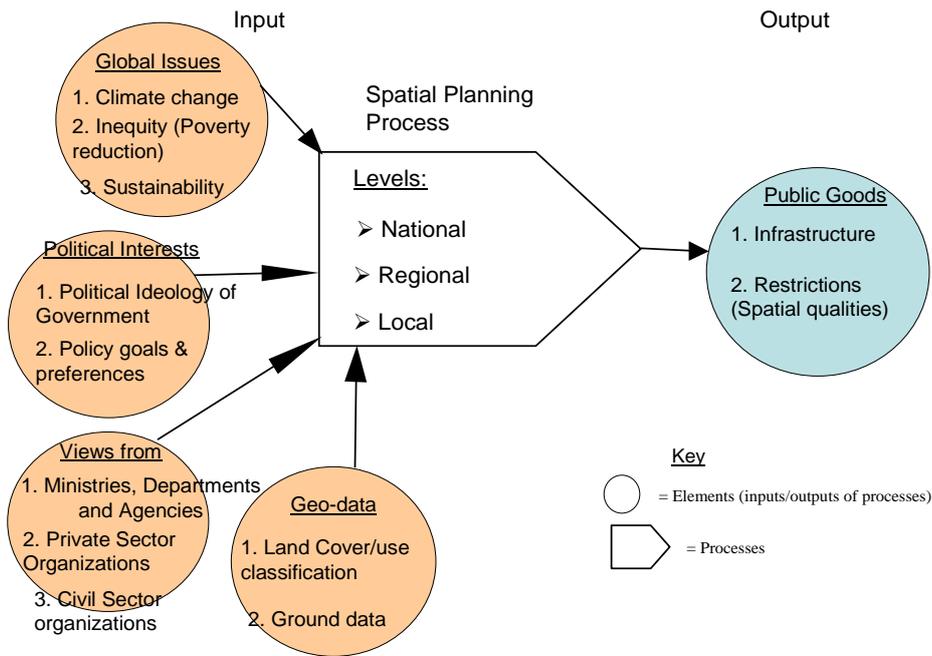
Figure 5: The Spatial Planning Process Model

This thesis has also established that the environment, economy and society are not independent of each other. Citizens in their roles as producers and consumers also pollute and deplete the environment in which they live and work. Hence the need for a multi-scaled, multi-levelled and multi-disciplinary approach to the theory and practice of spatial planning aimed at balancing economic development and environmental protection in local, regional, national and global scales and levels.

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