Landscape and Ecology

Lecture 2

Derelict Land

We will start with the derelict land .we associate the word derelict with landscapes that is damaged that is unsightly and degraded .we tend to think derelict land as Land that is not in a stable or productive condition. But derelict land can be defined as Land so damaged by industrial other development that is incapable of beneficial use without treatment. We see derelict land all over the worlds. There are Different types of dereliction. This derelictions are caused by activities such as mining, industries and dumping of waste. We will discuss about the different types of dereliction now. Mining is a major cause of dereliction. Surface mining leaves large holes in the ground as you can see in this picture. It leaves a large holes in the ground and also spoil heaps that forms ridges and valleys and these landscapes are known as hill and Dale landscapes. These are some more images of surface mining and we can see that in mining activity the top soil is removed. As a result there is erosion and pollution nearby water bodies. Another type of mining is Deep mining. This results in subsidence. Land subsidence is the lowering of the ground surface from the changes that takes place underground .Deep mining often creates voids below the underground. Such voids collapse and as a result the ground surface collapses. Here are some more images of subsidence where we can see sinking of ground surface. Mining also results in pollution, toxins released into soil water and air. Another type of dereliction is industries. Industries mostly leave behind waste heaps and derelict buildings and equipment's. But again there can be varied kind of dereliction. For example for a chemical industries toxicity maybe a problem. Transport system involves Railway lines, roads and bridges. When these components are not used or maintained vegetation starts to grow and sometimes there might be derelict stations and buildings. This is another common type of dereliction. Most of you might have seen even near your houses. Vacant land or land with deteriorating structure. This is another common scene in Indian towns and cities. Waste is dumped on to land or into the water bodies such dumping destroys the vegetation or destroys the ecosystem. So these are the different types of dereliction. Now we will look into the reclamation of derelict lands. Declamation is actually reclaiming of derelict land. Reclamation is returning disturb lands to a form in which the lands maybe of beneficial use. Often the derelict land often provide opportunities for reclamation. For example due to mining there might be spoil heaps. They can be incorporated as a feature in landscape or the deep holes on the surface can be used as water bodies but this needs to be supported by hydrological and geological conditions. In terms of dereliction by industries sites are often found very close to the urban areas. So once it is reclaimed it will be of high value. Transportation system results in linear derelict lands. This has potential for recreation. So now we will learn about the reclamation process. There are three important steps for the reclamation process.1.the establishing objectives.2. Determining influencing factors3. Selecting reclamation methods. We will learn about each of these steps now. First step is establishing objective. In general the objectives of reclamation process are Removal and prevention of pollution .Restoration of Health and fertility of the landscape. Providing an agreeable Habitat for wildlife in a balanced ecosystem. Providing specifically for a

planned land use or allowing for a flexible future land use. Providing a Visually acceptable landscape that fits into surrounding landscapes without discord. .The most frequent aim of the reclamation is to put the land to some useful function. But the emphasis may need not be putting land in to good use. Important should be ensuring the healthy state of the land and establishing a landscape pattern that is self-sustaining. The second step is determining the factor that influence the reclamation method. There are two important factors one is functioning of the site after reclamation and the second one is site characteristics and nature of disturbance site. Functioning of the site reclamation is an important factor. Both economic and environmental factor influence this. There are Variety of site factors that influence the reclamation process. Some of them are: Existing soil characteristics Existing vegetation Annual and seasonal precipitation. Temperature extremes, Evaporation rate, Wind, Slope aspect and elevation, Drainage pattern. Animal insect and human behavior pattern the third important step is the reclamation method. Depends on the various influential factors that we saw in the previous step both the side characteristics and the use of the land after. Reclamation plays a very important role in determining the reclamation process. But these are the general steps. Removal of blight. Reshaping the disfigured earth. Restoring the top soil section reestablishing the natural covers Identifying land use. We will look at each of these steps now. First step is the removal of blight. Most derelict lands contain some kind of waste. The first step is to remove the trash, debris, Weeds and all other forms of pollution from the site. The next steps is reshaping the disfigured earth. Often re contouring or regarding is required. Is mainly done to control erosion or sometimes the use of the land after reclamation also determines the degrading. The third step is restoring the top soil section. Top soil is the upper surface of the earth crust which can support the growth of vegetation. So this is essential to establish vegetation growth on the site. The fourth step is the Reestablishing the natural covers. It is done for two purposes. Initially a temporary erosion control planting is done to establish quick cover. This way erosion can be controlled and soil quality can be improved. Plants such as grasses and other ground covers are used for this. Purpose. Another One is permanent planting this is done to sustain the vegetation for a substantial period of time. Factors influencing the plant selection are: The physical chemical and biological nature of the derelict surface. The extent to which levels vary over the site. The ease or difficulty of drainage. The risk of subsidence or settlement. Availability of filling and topsoil. Any liability to flooding or water logging .The adjoining land usesand also the purpose for which the land is reclaimed.

And the last step is identifying land use.

Very often Reclamation starts with an end use in mind and again this decision depends on many factors. Some of the common uses are industrial development, housing recreation, agriculture and nature Reserves. So we looked at the reclamation process. Now we will look at some successful cases of reclamation but before that I would like to clarify you the meaning of few terms. We have been using proclamation as an umbrella term to denote not many different kinds of activities. Reclamation is actually returning the disturbed plan to a form in which the lands may be of beneficial use. So here the land can be put into any use. Whereas the other commonly used term is the restoration. This means returning a disturbed site as closely as possible to pre disturbance conditions and functions. So that is the difference between reclamation and

restoration. In Restoration the site is brought back to its original condition. Another related term is conservation means of preventing for the deterioration of land resources.

Case Studies

Now we will look at the case studies. We will be discussing about 2 case studies. One is the Restoration of a quarry in Gujarat and other one is a park urban Park in New York. The first project is the ecological Restoration of a basalt Quarry in timba Gujarat. Images before restoration. In this site basalt deposits were mined up to a depth of 20 meter. As a result vegetation was in a very poor condition. Stones and Quarry dust were heaped all over the site in a haphazard manner. This was nearly a 200 acre site. These are some of the images of the site before restoration, some more images before restoration. We can see there is very poor vegetation and there are Quarry dust distributed in a haphazard manner. So the restoration project began with an objective. To convert the total quarry into a natural Woodland and return it back to the nature. Show the Restoration started in late 1970 and it extended for a period of 8 years. So here the different stages of restoration process we can see. This is before the mining activity. The mining activity left deep holes inside the site and also overburden and other query dust distributed all over the surface the site. As a process of restoration first topsoil was established and pioneer species were established that led to the growth of trees and other shrubs. We will look at each stage now. The first stage is establishing the vegetation cover with grass Herbs and other Creeper plants. This is essential because it enables humus formation. And that helps in conserving the soil moisture and rain water. As a part of this process weeds from nearby areas were developed on the site. As a result within 2 years the entire site was covered with grasses and other low level shrubs. Based on the study of vegetation pattern region an indigenous plant mix was identified. From this list seedlings of trees were planted in Shallow pits using the available organic matter in the site. In addition a nearby seasonal stream was diverted to fill the quarry. So this is the view of the site after 4 years.3rd and 4th year other plants and grasses and shrubs that were not originally planted made their appearance on this site. At the end of the 8 year several trees had been established and started flowering and seeding. So this is the plan of the restored quarry so we can see water bodies and vegetation very well established and also a pedestrian trail. These are the images of the restored query. The entire area acts as a habitat for many different species such as insects and snakes .Approximately more than 140 varieties of birds visit the site every year. This is how the site look before restoration and through Restoration it has transformed into self-sustaining forest like this. So that is an inspiring example of ecological Restoration project. Next we will look at an urban Park. Is known as concrete plant Park which is located along Bronx River in New York. Along the banks of the Bronx River a concrete mixing plant operated from 1945 for a period of 40 years somewhere around the middle of 1980 the operation stopped. As a result 7 acres of site well left like this. The site was filled with 2 to 3 feet of concrete. Nearly 16 leaking petroleum tank where buried in this site. As a result 32000 tons of soil were contaminated with Petroleum. In addition there where old factory like structure and more than 10000 tyres where also found on the site. The Restoration project began around 2005. And this project was made possible due to community participation. The community envisioned this Park as an educational laboratory Quiet Contemplation space. Destination for creative and unstructured play. A record of the neighborhoods past and

history. So the Restoration and design was carried out and the park was completed and open to the public in 2009. Today it provides space for both active and passive recreation. It also provides opportunity to connect with the river visually and physically. So as part of the Restoration process salt Marsh Habitat was established. Salt Marsh planting was restored along 2 more than the 70% of the Shore line so today the park is I live with Birds insects and fish. The design also allows visitors to engage directly with the river and its ecosystem. As a result it almost was like and outdoor classroom for the students of nearby schools. As part of the Restoration project grading was carried out. This was done to make the parks more bike and pedestrian friendly. It was also done to slow the flow of storm water runoff. Trees were also planted mainly to provide shade. One of the design concept of restoration project is to keep as much as material as possible on site. So blocks made of leftover concrete where saved and re-used in the park. It was mainly used as a transition element between the site and the river. You can see here again. Sand and gravel from the old plants where used to produce concrete for the bike and pedestrian parts that run through the park. And again this was done to keep the material on the site. Even the concrete mixing structures where retained as design futures features this is before Restoration and after restoration this mixing structures became part of the design. And the design also aimed to incorporate the industrial past of the sight. The history of the site was incorporated into the design. The design of the raileys and shells reflected the structures in and around the site. These are the images before and after restoration the structures were become part of the park now. So today this Park meets the needs of a wide variety of users and it provide spaces for both active and passive recreation. It balances the community's wishes while mitigating environmental impacts. So these are the inspiring examples of reclamation and ecological restoration. However these projects demand substantial resources high level of participation of stakeholders and coordination between multiple Agencies. Why it is possible to retain the derelict land, reducing or preventing such damage is a better option. Is it possible to prevent such damage while implementing a project? Yes it is possible. One of the tool available to us is environmental impact assessment popularly known as EIA.

EIA

EIA is a formal process for identifying Likely effects of activities or projects on the environment and on human health and welfare It is also a process for identifying the means and measures to mitigate and monitor these impacts. As a planning tool it involves both decision making and information gathering EIA is defined as systematic study process for identification of potential impacts of proposed projects plans and programs, related to Physical chemical, biological, cultural, and socio- economic components of the environment. Before learning the process I just want to explain the meaning of some important terms. The word impact means a deviation for a change from the baseline situation that is caused by the activity. In this case the activity means a desired accomplishment or output. It could be a construction of a road or a construction of dam. A project or program may consist of many activities. Baseline situation is the existing environmental situation or condition in the absence of the activity. To measure and impact we must know what the baseline situation is. So when we say environment we don't mean just biophysical environment. It includes socio cultural elements also. So some of the important environmental components of interest are: Physical that includes topography, geology, soil types,

and water resources air quality. Biological components such as Terrestrial and aquatic ecosystem that is flora and fauna. Socio economic components such as demography, development needs and potential, infrastructure facilities economic activities, etc. Cultural components such as the location and state of Archaeological, historical, religious sites etc. . .. . EIA process can be divided into two phases. The first one is initial enquiry phase and the second one is full EIA study. All projects need not go through the second phase. Projects which have substantial negative impact only go to the full EIA study phase. We will see this process little more in detail. The first phase is initial Inquiry. So EIA process starts with an initial understanding of what is being proposed and why is the activity being proposed. The next stage is screening. Here the basic set of questions about the project is asked to identify the risk levels. Based on the analysis the project can be categorized into three levels 1 is the low risk activity. In this case the project is very unlikely to have significant adverse impacts. Another category is moderate or unknown risk. Third category is high risk. In this case eject is likely to have significant adverse impacts. If the project is found to be low risk then there is no need for the EIA process. If the project is found to have moderate or unknown risk then preliminary assessment is conducted this is a Rapid EIA study using simple tools. And this can result into findings. The assessment can say the significant adverse impacts are very unlikely due to the project in that case. There is no need to do an EIA. If the assessment find significant adverse impacts are possible due to the project then the full EIA study needs to be carried out. From the screening project if the project is put into high risk category even then full EIA study needs to be carried out. So in this EIA process three outcomes are possible. First stop the EIA process conduct a preliminary assessment. III is the full EIA study. So now we will look at the preliminary assessment and fully EIA study component. A typical preliminary assessment contains the following components. First is the background that includes development objective and the list of activities to a project or a program. The next component is the description of the baseline situation. The third is the evaluation of potential environmental impacts Mitigation and monitoring and the 5th is recommended findings. We have already looked at the baseline and impacts. We will just see what is mitigation and monitoring. Mitigation is implementation of measures designed to reduce the undesirable effects of a proposed action on the environment
Monitoring is determining whether the mitigation measures are being implemented as required whether the mitigation measures are efficient and effective. The final component is the recommended finding. There can we three possible findings at this stage the finding may say the project is very unlikely to have significant adverse impacts. In that case the EIA process ends. Or the finding may say the project is unlikely to have significant adverse impacts with specified mitigation and monitoring. The third possible finding is the project is likely to have significant adverse impacts and in this case full EIA study needs to be carried out. No we will see the components of full EIA study. The basic steps involved in this EIA study are: Scoping. Evaluating baseline situation. Identifying and choosing alternatives.
Identifying and characterizing potential impacts of proposed activity and each alternative developing mitigation and monitoring. Communicating and documenting.
We can see that these components are almost very similar to preliminary assessment however in a full EIA study all these components are studied much more in detail. Another important component of the full EIA study is the public participation .this facilitates the predicting of

impacts and it also helps in judging the significance of impact. Shaw public participation is an important component of the EIA study. What we saw now is a generalized standardized EIA process but however in each country the process may vary. EIA it is required by law in most country now we will look at EIA in India. Environmental protection act was enacted in 1986, this act is also referred as umbrella act. Under this EP act, EIA notification was issued in 1994. A new EIA notification was issued and this substituted old one. And this notification list the projects or activities requiring prior environmental clearance. The EIA notification establishes four stages for obtaining environmental clearance .They are Screening, scoping, public hearing and appraisal. But all projects need not go through all these four stages. Now we understood the process of EIA. Now we will look at the benefits of the EIA process. It potentially screens out environmentally unsound projects. It identifies feasible alternative. Predict significant adverse impacts Identifies mitigation measures to reduce, offset or eliminate major impacts. It engages and in forms potentially affected communities and individuals. It influences decision making and the development of terms and condition.

EIA is an important planning tool. However to make this as an effective tool they should be made as an integral part of the project development cycle. For this EIA must be undertaken early enough to affect project design. Mitigation and monitoring developed in the EIA process must be implemented. And EIA should be carried out honestly. That means EIA study must consider real alternatives and impacts must be assessed honestly. Another aspect is transparency and accessible. The EIA products must be clear and accessible to key stakeholders