



# RESTORATION OF DEGRADED LAND & WATERSHED MANAGEMENT – RESEARCH PAPER

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## **Abstract**

Land being the major resource among all the other resources present in India comprises water, soil, flora and fauna involving the total eco system. With the growing population, the quality of land is being compromised while meeting the human needs. Land is used for various purposes such as urban settlement, dams, highways, plantation of non-native trees and so on, without concerning about proper provisions for drainage, and improper agricultural practices. This has caused some serious levels of land degradation, which leads to soil erosion, loss of soil fertility, destruction of species habitat and biodiversity, pollution of underground water, depletion of water table and etc. Watershed management has proved to be very beneficial for water conservation over these past years and we aim to use this technique to improve land quality as well. The present research work is carried out in Mumbai and especially focuses on the city's Aarey forest, which is known for its rich biodiversity, but as per our researches the quality of the land is as bad as a barren land due to non-native plant species that serves no purpose in enhancing and regulating the land quality, also the unscientific use of land has lowered the ground water levels all over Aarey.

## **Introduction:**

Research areas in the field of degradation focus mainly on research guidelines such as rehabilitation and reconstruction, as well as sustainable management of land resources. Restoration is still relatively new science. Increasingly known is the new discipline of restorative ecology. Land reform occurs in varying degrees. Land degradation “the reduction or loss of biological or economic productivity as a result of land use or process or combination of processes, which includes human activities.” When deforestation occurs in desert areas, especially dry, arid and low humidity areas, it is called desertification. Land degradation poses a serious threat to food security and the environment, and environmental degradation problems are particularly acute in rainy regions. Land conservation measures and land reform are determined when considering land potential and land use. Land degradation can effect climate change and endanger agriculture, water purity, ecological balance, sustainable

development, and the living requirements of human being and wildlife, among other effects. India is committed to reducing land degradation and desertification. In fact, India's goal is to achieve a state of neutralization of land degradation and restoration by year 2030 when the increase in land degradation will be offset by the benefits. Watershed management "is a process of creating and implementing water programs, and projects to stabilize and improve aquaculture facilities that affect plants, animals and human communities within the water boundary. "on contrary of heavy rainfall, people have to depend on the water tanker to get their domestic water needs in the summer in many places. This is mainly due to the large flow that causes water loss as well as soil loss. A drop of rain, as it flows down the slope, carries the loose soil alongside it. In this case the top layer of soil is quickly lost. Due to heavy rainfall, it is estimated that more than 100 tons of soil is lost .The methods used to prevent this damage to the soil and water are one of the best ways to improve the water environment. The Watershed Development Program is a transformation program that aims to meet water needs in waterless areas. If we take steps to encourage each drop of rain to fall into the ground at the point where it hits the earth, it will result in the addition of one drop to our useful water source and the removal of one drop from the potential flood. Management of every drop of rain that falls to the ground. In areas where there is not enough water supply management it provides the right solution. It helps to use the main water source and prevents water from flowing into the sewers or storms, thus reducing the load on the treatment plants. Indeed, water as a necessity for all living things needs to be used wisely because of the overuse of those precious natural resources. Therefore, the wetland management system has proven to be very beneficial for water conservation. Analysis and testing tools such as GIS and remote sensing proved to be very efficient and effective and that is why they are so useful in managing such a useful resource. Fixed maps include drainage pattern, concrete map, elevation map and land use / land cover map. Based on these maps, three suitable sites for water management plans are proposed

### **Application:**

Without coverage of plants and trees, soil erosion occurs very easily. Ongoing efforts at forest management and reforestation programs are key to combating soil degradation. Organic farmers who add manure and compost to the soil replenish nutrients while reducing the risk of floods and carbon offsets. Proponents of the ecosystem recommend that they do not send bio-waste into landfill but use it to build organic soil, fertilizers & growth in it. Monsoon water and additional groundwater, its management is an ongoing process. The ridge to valley approach to soil and water conservation measures can only be successfully managed with a watershed concept. Properly identified, treatment options can be positively impacted. The extra water available during unexpected rainfall in the short term can be used to fill enough groundwater instead of allowing it to be lost through the flow. Integrated management will therefore provide maximum use of surface water and groundwater for the purpose of river management. Thus, some common guidelines should be followed to force the flow of water to meet the groundwater dam.

### **Methodology:**

The methodology adopted for the present topic area includes :

- By observation and discussion with local people of Aarey colony
- By personal interviews of the local people and listening to their problems.
- Finding unique solutions for the problems faced by locals.
- Using of Q-GIS and GOOGLE MAPS developed all possible maps required.
- Identifying the soil type, stream line, climate, topography, information about the species, native and non-native species, etc.
- By doing Technical Survey including contour lines surveys, elevation survey, giving land use details.

## Tests Done To Determine That The Land Is Degraded:

The site we selected in Aarey forest land, a conserved area. We took the following tests to prove that the land of our site was degraded.

### 1. JAR TEST



### 2. PH LEVEL OF CONTAMINATED WATER



### 3. CHEMICAL OXYGEN DEMAND



### 4. BIO-CHEMICAL OXYGEN DEMAND



**Parameters Obtained From The Following Test :**

JAR TEST :

Sample	Point 1 (in cm)	Point 2 (in cm)	Point 3 (in cm)
Clay	5.5	6.5	7
Silt	3	3	3
Sand	1.5	1	1

Actual

contents of clay, slit, sand found in our specimen. (in cm)

STREAM LINE / NALLA TEST:

COD AND BOD TEST RESULT:

**TEST REPORT**

ISSUED TO: Ms. PRIYA MORANIYA Ms. MEGHNA PADWAL/Mr. SMIT SHAH B 301,TARA Apt. Behind Navghar Police Station. Navghar Road ,Bhayandar East Thane -401 105	REPORT NO. : UT/ELS/REPORT/0704/02-2022 ISSUE DATE : 15/02/2022 YOUR REF. : Verbal Confirmation REF. DATE : 11/02/2022
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<b>SAMPLE PARTICULARS</b> :	<b>WASTE WATER SAMPLE ANALYSIS</b>
<b>Sampling Plan Ref. No.</b> : NA	<b>Sample Type</b> : Sewage Water
<b>Sample Registration Date</b> : 11/02/2022	<b>Sample ID</b> : Aarey Stream-Nallah Flowing Water
<b>Date &amp; Time of Sampling</b> : 11/02/2022at 08.:30Hrs	<b>(as Described by Client)</b>
<b>Analysis Starting Date</b> : 11/02/2022	<b>Sample Quantity</b> : 1L In Plastic Container.
<b>Analysis Completion Date</b> : 14/02/2022	<b>&amp; Packing Details</b>
<b>Sample Collected By</b> : CLIENT	
<b>Sample Lab Code</b> : UT/ELS/264/02-2022	

Sr. No.	Test Parameter	Test Method	Test Result	Unit
1.	Biochemical Oxygen Demand (27°C, 3Days)	IS 3025 (Part 44) : 1993	142	mg/L
2.	Chemical Oxygen Demand	IS 3025 (Part 58) : 2006	703	mg/L

Opinions / Interpretations: NIL

**Note:** 1. This test report refers only to the sample tested.  
2. This test report may not be reproduced in part, without the permission of this laboratory.  
3. Any correction invalidates this test report.

**- END OF REPORT -****Test Of Soil- [For Identifying Native & Non Native Species]:**

In our reference site we had done a survey regarding the trees species the ratio comes to 2:10 where 2 stands for native trees and 10 stands for non-native trees. This test is done to have a clear idea about what type of biodiversity present on our site which helps to prevent from further land degradation these non-natives species decreases the soil biodiversity making it devoid of water, humus, organic matter. Therefore making the soil as hard as a stone and not allowing native tree species to grow on that soil

Non-native do not attract birds and animals because these non-native trees are not their food source. Therefore no avifauna and mammal species are seen or present at our site. Following are the non-native species found:

Australian Acacia (Acacia mearnsii), Rain tree (Samanea saman), Copper pod tree (peltophorum pterocarpum), kapok (ceiba pentandra), Gliricidia (gliricidia sepium).

## Interpretation & Solution Based On Results:

- By taking all these test we had proven that our land is degraded and polluted. Following are the steps to restore degraded lands.
- Plantation of native trees species to bring back soil and animal biodiversity for overall restoration.
- Construction of Integrated Watershed Structures, according to the topography & geography of the land, thus increasing the ground water level and checking of erosion.
- Construction of Wetland Structures to clean & filter the pollutants carried by stream/nalla, thus preventing ground water & soil pollution.

## Conclusion:

Along with the measures taken by Aarey Forest Department. If we adopt these measures for land restore & water harvesting, it will enhance ground water storage. In our case study land is preserved and water is conserved naturally. By planting native trees, constructed wetlands, building contour trenches, soak pits, small check dams, gabion structures, bunds. The work will be executed with the help of local community, volunteering and forest department.

