Lab Activity – Natural Resource Monitoring Plan

Introduction

Natural resource monitoring is essential as this provides a valuable tool for improving management practices and allowing us to know whether the condition of the natural resources’ we have in our particular environments is stable, improving or declining. The successful management of our natural resources requires regular monitoring activities of the condition and or state of such resources. Detecting the changes at an early time will also enable us biologists to adjust our management practices and or take remedial actions sooner for more successful results in dealing with these particular resources in our environment. Conducting natural resource monitoring is important as we are able to expose the problems before they become intractable, develop benchmarks against which performance and effectiveness can be measured, identify and prioritize future requirements and initiatives and develop soundly based applications to better understand the issues emanating on our natural resource processes.

It is important to realize that the reasons of why we are doing natural resource monitoring is to be able to understand the state of the ecosystem and their health and the issues that need management and or actions so that we can attain an environment not just for our present generation but also for those in the future generations.

General Instructions: In this particular laboratory activity, each group has an option to do at least one of the natural resource issues for which monitoring is important. These are as follows:

1. Native vegetation
2. Pest plants
3. State of the water bodies and water quality

Each group has to work on a particular natural resource issue of their choice and come up with a natural resource monitoring plan of the selected issue and apply it to their corresponding area. The groups’ conducting the activity will have to organize their monitoring program so that it will be necessary to find answers on the following questions?

1. What will be the aims of the monitoring?
2. Who will participate?
3. What area is to be covered?
4. What is to be monitored?
5. How often will monitoring be carried out
6. How will the assessment be recorded and discussed?

The answers to these questions form the basis of the group’s plan of action. For the groups, it is a good idea to document and specify who is going to do what and when. For the given specific issues, details will be provided as each issue is discussed.

The report should be able to show the following parts:

1. Identifying issues D) Recording results
2. Identifying sites E) Interpreting results
3. Photographing sites

Activities:

Issue 1: Native Vegetation

The procedure to be used and guide on how to go about the natural resource monitoring for this particular resource issue is provided in the table below.

Table 1. Assessment and Monitoring of native vegetation

|  |  |  |
| --- | --- | --- |
| Feature | Assessment/monitoring technique | Monitoring frequency |
| 1. size and shape of remnant | Draw a map of the area and include any vegetation communities within the remnant.  Monitor changes in overall size and shape of vegetation communities within the remnant by comparing edge with reference points or with photography | Initial assessment only  Weekly or Monthly |
| 2. Landscape patterns | Identify the landforms, position in landscape and aspect visually and from the map drawn in 1. | Initial assessment only |
| 3. Soil types | Techniques are described in the BIO160 lab manual for soil type determination | Initial assessment only |
| 4. Connectivity | Show adjoining areas of native vegetation on the drawn base map |  |
| 5. Plant species composition and dominance | Plant identification (use a plant identifier app)  Visual assessment of abundance/dominance incorporating photographic monitoring |  |
| 6. Vegetation community structure | Visual assessment and classification  Comparison with regional ecosystem maps obtained from the net sources |  |
| 7. Vegetation condition | Photographic monitoring and visual assessment |  |
| 8. Fire history or history of man-made activities | Mark extent and type of previous fires or man-made activities in the area in relation to plant species composition and vegetation community structure | Initial assessment and additional assessment following disturbances |

Recording sheet for this activity 1.

Site address:

Site description

Remnant Location (GPS detection using APP)

|  |
| --- |
| Latitude |
| Longitude |

Remnant Description (attach map drawn or actual map showing shape)

|  |
| --- |
| General description: |
| Size: |
| Relief class: (mountain, hill, low hill, plain, grassland, etc.) |
| Soil types: |

Connectivity (show details using overlay on attached map)

|  |
| --- |
| Existing barriers to wildlife movement: (roads, tracks, etc.) |
| Links to similar native vegetation: (density of canopy, width, no. of layers, etc.) |

Vegetation community structure

|  |
| --- |
| Description: (dominant species in each layer like tree, shrub, ground cover etc.) |
| Vegetation community classification and or regional ecosystem classification |

Vegetation condition

|  |
| --- |
| Description: (e.g. bare branches, exposed roots, damage to trees, invasion of weeds, nutrient build up etc.) |

Recording Sheet for activity 1:

Plant species observation list

Remnant name: Vegetation community:

|  |  |  |
| --- | --- | --- |
| Common name | Scientific name | Notes |
|  |  |  |

Activity 2: Pest plants

This activity looks at the occurrence of main pests affecting natural resources. Monitoring for pests provides an opportunity to monitor the presence or abundance of pests including invasive species so as to provide important indications of the general health of the ecosystem.

Procedure: Draw a base map of the area and assess the numbers of pest plants seen in the area and indicate the location of the pests in the base map drawn. Count the number of pest plants on a given site and estimate the area of the site. Derive the density (population count divided by area) of a given pest plant.

Materials: camera or phone with camera. Plant identifier app

Instructions: The following entries on the said assessment will be undertaken.

1. Density of infestation – degree of infestation must be recorded using a density chart available in the net. Any recorded information should be backed up by photographs where possible. Different scales of density may be required for each identified pest plant.
2. Extent of infestation – aside from determining the density of the plants, it is important to know the size of area of infestation covered. One should determine whether you have a single isolated plant, a patch of a few square meters or isolated plants spread over the area. The size of the area should be recorded accurately as possible using the GPS coordinates provided by your phone.
3. Growth stage – record whether the plants are seedlings, in bud, flowering or have gone to seed. This will be necessary in the management techniques to be determined later.
4. Land use and type – land use of the area where the pest occurs will influence the type of control measure to be adopted. The details of the current management of the land will assist in understanding why the pest occurs in the area and what environmental adjustments could be made to lessen the impact of the plant.
5. Mapping – after gathering all data related to the infestation, this has to be shown on the maps drawn.

Recording sheet for Activity 2:

Plant species:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Date | Site name/# | Location | Density | Extent | Growth stage | Land use |
|  |  |  |  |  |  |  |

Activity 3: State of water bodies and water quality

The water quality of our waterbodies provides an excellent indication of the overall ecosystem health of the catchment area. The changing nature of these waterbodies and the interconnectedness of the system makes it difficult to compare one water body over another. By monitoring waterways, one can gain an understanding of what is normal and how the system should remain in balance. In this activity, the group will have the opportunity to assess how the waterbody is affected by various activities in its catchment area. The state of the waterbody will help use identify if any problems affect these systems.

Procedure: Choose a location, decide the aspects to be assessed and decide the sampling methods and record your observation. Draw a diagram of a stretch of the waterbody to study and make sure you include both banks. The important element to record are the indication of the scale of the waterbody (if available), the position and characteristics of the banks where erosion has occurred and where the banks are bare or have been undercut and or collapsed. The position and type of any vegetation, trees, shrubs and grasses.

The water quality of the waterbody is a result of complex interactions of many factors. We will be looking at the ecosystem health approach on assessing the water quality of the water body to get an indication of the water quality at the chosen sites. The habitat value and general water quality will be determined by using water bugs as indicator species. Soil erosion and water clarity can be determined by visually assessing the turbidity and the nutrient load can be assessed by observation. One can get a good picture of the water quality of a waterbody by finding out what lives in it. Benthic macro-invertebrates or waterbugs are useful indicators of the water body’s ecosystem health. The number and types of water bugs present can give us a picture of what the water quality generally is like over a period of time. This can be more useful that one-off testing the water quality parameters by physico-chemical means (e.g. dissolved oxygen, pH, etc.).

The method we will employ is a simple low-impact method due to the pandemic situation and this method will give a good indication of the water body’s ecosystem health from the types of benthic macroinvertebrates found.

Materials: Small dip net (available from shops or make your own by taping a fine strainer to a broom handle), deep-sided white tray for sorting, magnifying glass, paintbrush to help pick small animals.

Procedure:

1. Look at the surface for water striders
2. Collect a sample of the benthic macro-invertebrates from the site by sweeping the various microhabitats with the net.
3. Sweep around any vegetation or snags with your net
4. Determine what lives in the rocks and sediment by placing your net on the bottom of the waterbody, downstream of the area you are looking at. Gently pick up rocks or materials and rub them so that any animal on them is dislodged and washed into the net.
5. Empty contents of net into a white tray with 2-3 cm of water in the bottom. Closely look as these organisms are small and are hiding .
6. Use the identification sheet provided as photos attached together with this file and record them.
7. Check for erosion by looking at turbidity (if water running into the water course is clear but water in watercourse is muddy, no erosion in immediate catchment; if water running is muddy and water in the watercourse is clear, erosion can be within the immediate area; if water running is muddy and water is also muddy, erosion occur within the immediate catchment as well as further upstream).
8. Check nutrient load by observing signs (growth of filamentous algae, growth of water weeds, growth of weeds on banks, growth of reeds, death of native tree species, bad smell from water, appearance of algal blooms, surface scum)

Recording sheet for macro-invertebrate pollution tolerance data

Site name: Date:

|  |  |  |  |
| --- | --- | --- | --- |
| Rating of water | Sensitivity | Present | Notes |
| 4- excellent | Very sensitive organisms  Stone fly nymphs |  |  |
|  | May fly nymphs |  |  |
|  | Freshwater shrimps |  |  |
|  | Freshwater fish |  |  |
| 3- good | Sensitive organism  Mussels |  |  |
|  | Freshwater shrimps |  |  |
|  | Freshwater fish |  |  |
|  | Dragonfly nymphs |  |  |
|  | Damsel fly nymphs |  |  |
|  | Caddis fly nymphs |  |  |
|  | Water mites |  |  |
| 2- fair | Tolerant organism  Beetle (Coleoptera) |  |  |
|  | True bugs (Hemiptera) |  |  |
|  | Leech |  |  |
|  | Freshwater snail |  |  |
|  | Worms |  |  |
| 1. poor | Very tolerant organisms  Black fly larvae |  |  |
|  | Mosquito larvae |  |  |
|  | Fly larvae |  |  |
|  | Non-biting midges |  |  |
|  | worms |  |  |

Macroinvertebrate rating:

Recording sheet of water quality

Site Name: Date:

Site Description:

State of the bed and banks

1. Bank vegetation
2. Bank erosion and stability
3. Other observations

State of the water quality

1. Macroinvertebrate rating
2. Turbidity
3. Nutrients
4. Other observations