

Western Port Seagrass Partnership Ltd

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SUGGESTIONS FOR USING THE WESTERN PORT DVD AND WEB SITE IN HIGHER EDUCATION SETTINGS

The Western Port DVD and web site are excellent educational resources for all ages and educational levels.

For higher educational settings such as VCE and University, we recommend these resources be used in conjunction with suitably challenging environmental themes and projects.

The following suggestions have been prepared to assist educators in such settings.

1. FOOD WEBS AND ECOSYSTEMS

Food Webs:

Food webs are a simple way to illustrate the relationship that different species have to one another and the consequences of removing a species from an ecosystem. The study of food webs can be as simple as drawing the main species that rely on one another and talking about relationships or as complex as identifying the ‘keystone’ species within an ecosystem and exploring the intricate detail of lifecycles, population dynamics and species dependencies.

Tasks:

- Create a list of all the species that you can think of that live and/or feed in Western Port.

- Using the list create a food web of species that live in Western Port.
- What are some of the key relationships?
- How does the ecosystem exchange with other systems around it?
- What impacts are humans having on the web?
- What changes can humans make to their behaviour to strengthen or protect the ecosystem?
- Identify the 'keystone' species. What makes them integral to the ecosystem?
- Explore the lifecycles of a selected species. Do relationships between species change depending on life stages?
- How does the removal of one species impact on the balance of the ecosystem?
- Which species are clearly dependent on others for survival?
- Are there less obvious relationships between species that are important for ecosystem balance? What are they?
- Can find examples of conservation projects where relationships have been renewed and ecosystem functioning has been restored? Could these processes be applied to Western Port?

2. RESTORATION OF COASTLINES/ESTUARIES

Why are ecosystems threatened?

Without doubt humans have had the greatest impact on the environment compared with any other organism. The majority of this influence has resulted in some form of damage or alteration to ecosystem functioning. Some ecosystems are destroyed almost instantly, whilst others deteriorate more slowly under the accumulation of daily assaults.

We **ALL** contribute to ecosystem deterioration. Our impacts are many and varied such as human traffic, urban runoff, agricultural discharge, habitat clearance and atmospheric pollutants.

Natural disturbance, such as fire and flood, is a normal part of ecosystem functioning and is often a means of stimulating change and regional diversity.

In contrast, human disturbance such as forestry, urbanisation and mining is often repeated and severe.

Endemic species are the most vulnerable to human disturbance. Due to their specialisation, change is not tolerated well and these species struggle to survive. As the world becomes increasingly homogenised, alien/exotic species, which are generalists, are more able to establish themselves and outcompete endemic species.

What is natural restoration?

Natural restoration is a relatively new discipline that involves the use of different strategies to assist the recovery of ecosystems that have been degraded, damaged or completely destroyed (SER 2004).

One of the main objectives of natural restoration is to assist the ecosystem to return to a position where it has enough stability to regenerate itself and the ability to withstand natural stress events.

In 2002, the Society for Ecological Restoration International published a primer to outline Ecological Restoration as a theory and practice.

The SERI has outlined 9 attributes that provide a basis for measuring restoration. The nine attributes are outlined below:

- 1.** The restored ecosystem contains a characteristic assemblage of the species that occur in the reference ecosystem and that provide appropriate community structure.
- 2.** The restored ecosystem consists of indigenous species to the greatest practicable extent. In restored cultural ecosystems, allowances can be made for exotic domesticated species and for non-invasive ruderal and segetal species that presumably co-evolved with them. Ruderals are plants that colonize disturbed sites, whereas segetals typically grow intermixed with crop species.
- 3.** All functional groups necessary for the continued development and/or stability of the restored ecosystem are represented or, if they are not, the missing groups have the potential to colonize by natural means.
- 4.** The physical environment of the restored ecosystem is capable of sustaining reproducing populations of the species necessary for its continued stability or development along the desired trajectory.
- 5.** The restored ecosystem apparently functions normally for its ecological stage of development, and signs of dysfunction are absent.
- 6.** The restored ecosystem is suitably integrated into a larger ecological matrix or landscape, with which it interacts through abiotic and biotic flows and exchanges.
- 7.** Potential threats to the health and integrity of the restored ecosystem from the surrounding landscape have been eliminated or reduced as much as possible.
- 8.** The restored ecosystem is sufficiently resilient to endure the normal periodic stress events in the local environment that serve to maintain the integrity of the ecosystem.
- 9.** The restored ecosystem is self-sustaining to the same degree as its reference ecosystem, and has the potential to persist indefinitely under existing environmental conditions. Nevertheless, aspects of its biodiversity, structure and functioning may change as part of normal ecosystem development, and may fluctuate in response to normal periodic stress and occasional disturbance events of greater consequence. As in any intact ecosystem, the species composition and other attributes of a restored ecosystem may evolve as environmental conditions change.

Other specific goals such as habitat for rare species, or the provision of natural goods for social development programs are also expected to be added where they are appropriate.

Tasks:

- Try to identify the major differences between this site at Western Port and a terrestrial site.
- How do the vegetation, soil and fauna differ at this site as compared to a terrestrial site?
- What are some of the agents actively affecting the geomorphology of this area?
- What are some of the dynamics of this area that you would need to think about in regards to planning your restoration work?
- Can you identify both internal and external threats and pressures that are affecting this site?
- Can you propose any management strategies that you think may be beneficial to the protection of this site and the related seagrass?
- Outline the species that are most directly effected by the degradation of this area? Why are they important?
- What are some of the difficulties with restoring coastal areas? These may be social, cultural, historical or environmental.

CATCHMENTS

The management of our water as a resource along with the land that it travels over and through is known as Catchment Management.

Catchments can vary in size from a few hundred meters to many thousands of square kilometres depending on the water body that is being studied.

The condition of a catchment is dependant on many integrated ecological systems such as the hydrologic (water) cycle, geomorphology, soils, vegetation, climate, extreme climatic events and global warming. Other influences include human intervention, pollutants, and bushfires. These conditions will vary depending on the area of the catchment being studied.

Some catchments remain in a fairly natural and undisturbed state, especially the upper reaches. However these conditions may change dramatically due to a number of factors, including human activity impacts, with the lower discharge points to lakes, bays and oceans often showing the greatest impact.

An understanding of the relationships between these natural factors is vital to sustainable and effective management of catchments.

HUMAN IMPACTS:

Human impacts on catchments can be complex and far-reaching. These may include logging, clearing of vegetation, agriculture, water harvesting, urban development, industrial development, and other types of land use.

Population expansion has resulted in growing urban developments and the use of intensive agricultural practices. Large packages of land have been cleared for farming and housing development. Waterways have been used to provide water for many uses and as dumping grounds for effluent and discharge.

Without doubt human populations have and will continue to change the natural character of catchments. It is also evident that climatically driven changes to our natural ecosystems are on the rise.

It is important then that the management of catchments incorporates:

- changes to natural systems*
- current and past land use practices*
- protection and management of water sources*
- forecasting and appropriate management for the future.*

Tasks:

- Create a timeline of the historical events that have resulted in the formation, development and degradation of the Western Port Catchment?
- What is meant by a healthy catchment? Outline the main biotic components that are vital to a healthy catchment?
- What are the main land management issues that are impacting on the Western Port Catchment?
- What human needs are met by Western Port Catchment?
- What ecological needs are met by Western Port Catchment?
- Identify any clashes between these 2 areas. Are there ways that both can have their needs met by a change in management?
- Identify the main bodies that are responsible for managing the Western Port Catchment. What are their respective roles? How well do they work together? How effective are they? List strengths and weaknesses.
- What role the community have in the management of the catchment? How can this be strengthened?
- Development is increasing around Western Port. Outline the impacts that development has on a catchment. What are some of the strategies that government and industry are adopting to protect catchments from the impacts of development?