生物策略格式

KJC, 2019/10/21

類別	生物策略 (Strategy)
生物策略 STRATEGY	有機體移除營養元素的交互作用 (Interacting organisms remove nutrients)
生物系統 LIVING SYSTEM	濕地 (Wetlands)
功能類別 FUNCTIONS	#控制沖蝕/沉積 #循環養分 #氣體/水分/廢物解毒/淨化 #Control erosion/sediment #Cycle nutrients #Detoxification/purification of air/water/waste
作用機制標題	溼地藉由植物、細菌和物理過程的交互作用，移除水中的營養源及沉積物 (Wetlands remove nutrients and sediments from water as plants, bacteria, and physical processes interact.)
生物系統/作用機制示意圖	

作用機制摘要說明 (SUMMARY OF FUNCTIONING MECHANISMS)

健全的濕地生態系統常常被視為自然的濾水系統。濕地可以移除從周遭土壤及水來的營養元素及沉積物以作為在陸地、水與空氣中循環的一部份。舉例來說，像氮、磷這類的營養元素會被水中的細菌及溼地植物使用以利於他們的成長。物理過程像是過濾或沉澱作用 (微粒在水中沉積) 也可以移除水中的營養元素及微粒。這些生物及物理現象以及其他因素如溫度和地理結構影響著濕地整體的運作。

舉例來說，密集的濕地植物會使水流變慢，使微粒有更多時間可以沉積、營養元素有更多時間可以被植物及細菌攝取。此外，濕地植物的葉子，莖和根提供細菌及微生物及大的表面積並附著在上面。特定的濕地細菌攝取硝酸鹽 (nitrate)（一種含氮的離子態），將它轉變為氮氣並釋放到大氣中。這樣的脫氮作用是在溼地中最主要移除水中氮的方法。植物攝取營養元素只是暫時的儲存他們，營養元素會在植物死亡和被分解後再次釋放出來。儘管如此，植物的存在以及它們與其他有機體的互動依然可以促進濕地淨化水流。

Healthy wetland ecosystems are commonly seen as natural water filtration systems. Wetlands can remove sediments and nutrients from the surrounding soil or water, as part of the natural cycling that these elements do between land, water, and air. Nutrients like nitrogen and phosphorous, for example, are taken from the water by bacteria and wetland plants that consume these nutrients as they grow. Physical processes like filtering and sedimentation (particles settling out of the water) can also remove nutrients and particles from the water. These biological and

physical processes interact with many other factors, such as temperature and land structure, to affect a wetland's overall function.

For instance, dense communities of wetland plants slow down water flow, which gives more time for solid particles to settle out and nutrients to be consumed by plants and bacteria. In addition, the leaves, stems, and roots of wetland plants provide a large surface area on which bacteria and other microbes can attach. Certain wetland bacteria consume nitrate (an ion containing nitrogen) in the water and convert it into nitrogen gas, which is released into the atmosphere. This process of denitrification tends to be the way that most nitrogen is removed from the water in wetlands. The plants take up some nutrients, but this is temporary storage as the nutrients are released again when the plants die and decompose. Nonetheless, the presence of plants and their interaction with other organisms in the ecosystem facilitate the wetland's ability to clean water flowing through.

文獻引用 (REFERENCES)

「隨著人類的活動持續地改變全球氮循環，預測增加氮源負載到流動水系統帶來的影響變得越來越重要。氮殘留是其中一個特別關注的重點，因為會透過多重組合的步驟而使氮素在當地或下游處減少（脫氮作用、氮沉積作用以及被水生植物所吸收）…我們證實了濕地保留了最高比例的總氮負載，然後是湖泊及河流。在這些系統中氮素殘留比例的差異，被解釋為幾乎全部由排水的差異造成。脫氮作用是氮素殘留中最初的機制，然後是氮素沉積作用，最後是被水生植物吸收。」(Saunders and Kalff 2001: 205)

"As human activities continue to alter the global nitrogen cycle, the ability to predict the impact of increased nitrogen loading to freshwater systems is becoming more and more important. Nitrogen retention is of particular interest because it is through its combined processes (denitrification, nitrogen sedimentation and uptake by aquatic plants) that local and downstream nitrogen concentrations are reduced…We show that wetlands retain the highest proportion of total nitrogen loading, followed by lakes and then rivers. The differences in the proportion of N retained among systems is explained almost entirely by differences in water discharge. Denitrification is the primary mechanism of nitrogen retention, followed by nitrogen sedimentation and uptake by aquatic plants." (Saunders and Kalff 2001: 205)

參考文獻清單與連結 (REFERENCE LIST)

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延伸閱讀:

生物系統延伸資訊連結 (LEARN MORE ABOUT THE LIVING SYSTEM/S)

https://en.wikipedia.org/wiki/Wetlands

文章貢獻/編修者與日期:

黃浩宸翻譯 (2019/04/29)；朱天愛編修 (2019/12/19)；吳晧編修 (2020/01/04)；譚國鎏翻譯/編修 (2020/07/29)；許秋容編修 (2020/11/26)；紀凱容編修 (2020/11/26)

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