

Literature on wetlands and climate change assignment



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Wetland ecosystems are particularly vulnerable to these changes as they rely on water flow and ground water for their functionality. In return wetlands filter water and support a high diversity and abundance of life often endemic and critical to the success of phases of certain plant and animals life cycles. Due to the diversity of wetlands their management and protection has been slow and often unsuccessful.

Scientific research has raised awareness of their importance in mitigation of climate change through acting as carbon sinks and habitat for significant species, so through education and stronger state and national water management plans wetlands have the chance to continue playing a vital role in our environment. (N. Campbell 2009). Many of Australia's Wetlands hold strong cultural and spiritual significance to Aboriginal people as they are a diverse resource that may have been used for many generations and may support certain 'totemic' plants and animals endemic to that small ecosystem (Department of Environment 2008).

Climate Change will affect wetlands natural structure, functions and distribution through temperature rises, changes in distribution, intensity and frequency of rain, sea level rise and stronger anthropogenic pressure as our world warms (T. Walsh 2008). Since the 1950s mean temperatures in Australia have increased 0.1-0.2°C per decade with the greatest warming inland and stronger storms and floods along the coasts (Intergovernmental Panel on Climate Change 2007). Introduction Wetlands are an important part of Australia's natural environment.

They contain a wide diversity of life providing habitat and supporting plants and animals that may be found nowhere else. Australia has more than 900 nationally important wetlands in coastal and inland locations, 65 of those are currently listed as Rams Wetlands of International Importance (Department of the Environment 2009). Wetlands are highly specialized ecosystems with functions that aid in nutrient cycling, act as carbon stores and improve water quality by filtering the passing water. Coastal wetlands create a barrier effect which protects surrounding environments from flooding, pollution and erosion.

Both coastal and inland wetlands sustain a high abundance of plant and animal life delivering rich habitat for food, shelter and protection for nesting for millions of waterfowl, birds and other vertebrates. Wetlands facilitate important stages of fisheries life cycles acting as nurseries for important fish stocks. They also aid in productivity of agriculture in floodplain pastures and valuable resource in times of drought. The effects of climate change will alter all aspects of wetlands of each diversity.

Increased temperatures and a decrease in rain causing a reduction of snow will strongly affect inland alpine wetlands as well as down the river as reduced water flows will be unable to support all of Australia's 3 Sailing Hall 21620531 81001204 important waterways. Sixty of Australia's Rams Wetlands are dependent on flow from other rivers. Less frequency of flood or an increase of flood will result in a decline in diversity and health of the wetland ecosystem which will in turn affect the values for which they were listed as international significant wetlands (D. Illuminated 2008).

As seventy percent of Australia's tropical coastline are mangrove and salt marsh a rise in sea level will have strong impacts on the health and distribution of its inhabitants and associated economic uses (T Smith 2009). Ultimately the impacts of climate change on wetlands will affect the biodiversity in Australia by forcing redistribution of species which will affect lifestyles, abundance of food and ecosystem structure. Many plants and animals will not be able to cope with the rapid changes it may take to adapt and relocate so we will see a strong change in the diversity, abundance and location of these ecosystems (D. A. Rosier 2001).

These changes to the physical and biological conditions of the environment will have cultural, social and economic ramifications for Australia's future (I. Idiot 1999). Creeks and the like are characterized by having constant fluctuating water at the root zone. They can be found far inland between dry terrestrial systems as isolated basins or along tidal regions or connected to rivers, lakes and estuaries (W. Mitch 2007). There is a strong difference in type and location of wetlands but they share the same roles in a landscape from providing habitat to influencing water quality through nutrient cycling and retention of particles.

However the functional capacity of wetlands is only able to continue provided that they are not exhausted beyond their critical loading limit (H. Hemmed 1988). Water Quality: The effects of wetlands on water quality depend on the location and chemical and biological composition of the system. The wetlands among riparian areas that border uplands are important sites for nitrogen processing and detention of larger sediment particles, whereas the wetlands downstream have reduced flow rates as <https://assignbuster.com/literatureon-wetlands-and-climate-change-assignment/>

surface water passes through plant litter and retain finer particles and phosphorous.

Revering systems also play a large role in processing nutrients and retaining sediment particles, especially during flood events which is an important function in raising The intention of this Literature review is to investigate the range of effects climate change will have on the diverse variety of wetland environments around Australia and examine the management strategies and policies that eve been put in place to protect the future of our wetlands capacity to remain a strongly unique and integral part of Australia's biodiversity. Eater quality to benefit all forms of life (D. Wigwam 1988).

Mangrove are important specialized wetlands in tropical Australia as they trap sediment from flood and filter the water heading into the ocean in regions prone to high rainfall intensity and flash flooding (T . Smith 2009).

Sediments in water can be detrimental to water quality and productivity. Turbidity caused by suspended particles decrease availability of sunlight thus decreasing the reduction of photosynthesis and oxygen production.

What's more if the particles are high in organic matter the biological oxygen demand and chemical oxygen

IMPORTANCE OF WETLANDS Wetland Functions: Wetlands are distinguished by the presence of water at the surface or within the root zone such as balloons, swap, marsh, mangroves and tidal 4 Sailings Hall 21620531 81001204 demand will further lower the dissolved oxygen level, which in turn lower the productivity of the ecosystem. Wetland unique hydrology and morphology enable them to act as specialized sinks, transformers and sources which enables them to clean and filter the passing water (W. Mitch 2007).

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These functions are important to quality of life in the environment as it allows the reduction of bacteria and viruses from the water through simple detention while natural die-back occurs and/ or aided by toxic root excretions of specialized wetland plants or ingestion by protozoa that feed on bacteria (D. Wigwam 1988). Accountable of 25% of its atmospheric levels, however they are the most effective ecosystem in retaining carbon by acting as sinks retaining 30% or more of global soil organic carbon sequester in sediment, peat and plant biomass which in turn balance the affects and have been referred to as ' climate change neutral' (W.

Mitch 2007). Estuarine wetlands have a minimal release of greenhouse gases due to the inhibition of antihistamines by sulfates. They also have a carbon question capacity per area much higher than any other and if left undisturbed are able to store carbon for a millennia. It has been studied that the rate of carbon sequestration in restored wetlands can exceed that of natural wetlands (A. J. Howe 2009).

Ultimately the ability of estuarine wetlands to continue sequestering carbon depends on their ability to adapt to changes in environmental conditions and warming of the environment will increase the risk of carbon being lost back to the environment (W. Mitch 2007). These risks along with human development destroying estuarine wetlands puts wetlands at further risk and increases the negative effects for all living biota due to climate change. This is strong evidence to suggest protection and rehabilitation of wetlands will be imperative to reducing the increase of carbon and slowing the process of climate change.

Nutrient Cycling: Plant Nutrient Removal is an important feature of wetlands as water passes through the system and feeds other areas. Nitrogen and phosphorus are important elements to plant production but in excess amounts can deteriorate the health of the water through the consequences of transportation (T Smith 2009). Wetlands receive nitrogen and phosphorus from anthropogenic and natural sources, the nutrient loading being highly dependent on topography, location and precipitation. Increases in rain causing flooding and run off into wetlands are major causes of excessive nutrients.

Fortunately wetlands natural slowing of flow rate allows nutrient uptake from plants and animals and retain nitrogen through sedimentation which enables identification by bacteria who release nitrogen into the atmosphere (D. Wigwam 1988). Biodiversity: The variety of wetland habitats provides for a diverse range of biotic communities, many specific Carbon Sinks: The function of wetlands in the global carbon cycle is important for reducing climate change. Wetlands cover only 6% of the earth's surface and hold 12% of the global carbon pool (Intergovernmental Panel on Climate Change 2007).

Wetlands high productivity can also produce methane and can be to the individual wetland. Australia is home to 600 000-700 000 species and 80% of the plants and mammals, 40% of our birds are endemic to our nation (D. Illuminated 2008). Most of these species rely directly or indirectly on wetland ecosystems and functions at some stage of life. Most of Australia's waterbeds are endemic and frequent arid Zones of the continent and

upwards of 5 Sailings Hall 21620531 81001204 8 million are estimated to use wetlands of our arid interior (D. Nielsen 2009).

Many other migratory birds and fish species rely on wetlands for food, shelter and safe breeding grounds which owe Australia the responsibility of intuition to ensure this resource is available to them as they are a shared species with other nations. Flow is a large factor in the wetland ecosystems biotic composition and many aquatic species have evolved in direct response to their environment. This makes them extremely vulnerable to any changes in frequency and intensity of rainfall events and the redistribution of rain accompanying climate change will alter the future of wetlands biodiversity (S.

Bun 2002). Accumulation of salts due to evaporation or rise in water table will shift species-rich freshwater communities to species-poor salt tolerant communities. The wetlands resilience or adaptation will differ in ecological response to these changes owed to the duration and rate the changes occur, resulting in possible permanent distribution and community structure changes to extinction of some species (D. Ninnies 2009). Development in coastal zones, wetland plant and animal species may not be able to adapt or retreat from the effects of rising waters as there simply may be nowhere to go (T Smith 2009).

It has been predicted that a rise in temperature in the tropics will transport a greater mass of water vapor towards higher latitudes. This will result in a decrease in precipitation in lower attitudes having a drying affect on wetlands, and an increase in precipitation in higher latitudes which will

create more flooding affects on the wetlands (T. Walsh 2008). Sea Level: Rises in sea level will have negative effects on coastal wetlands due to an increase of salinity and inundation of higher water levels and changes in temperature and tidal movement.

Encroaching tides will change the movement of sediment altering the TU rapidity and affecting productivity where effects will be seen cascading up the trophic web. The direct effects will differ depending on the type of wetland community. Given a slow event of sea level rise coastal wetlands may be able to migrate inland providing management allows adequate CLIMATE CHANGE Climate influences almost every aspect of a wetland ecosystem; biotic factors such as wind, rain and temperature directly and indirectly affect species distribution and abundance, as well as the wetlands composition, function and cycling of nutrients.

EPIC 2007 report estimates that global mean sea level will rise by up to 0.59 m by 2100 which will have adverse effects on coastal wetlands as they will be inundated with sea water, banks will be eroded, resulting in damage to fringe vegetation, suffer stronger tidal surges and changes in temperature and salinity. Due to high urban space for new communities to establish otherwise they may become extinct in many areas (C Oakum 2009). Another prediction is that freshwater wetlands along the coast will be replaced with the expanse of large wetland ecosystems and more southerly distribution of salt marshes and mangroves (L.

Hughes 2003). Sydney Universities Dry. Eleanor Bruce has used models to predict that wetlands of iconic Homebays Bay would experience a loss of

habitat by 21 00 due to sea level rise which will have large environmental and social challenges for the future planning (SSI 2009). Another important wetland at risk of severe loss is the UNESCO world heritage Kayaked national park 6 Sailings Hall 21620531 81001204 wetlands. The coastal plains of Kayaked are just 0.2 - 1. Meters above mean high water level and at risk of complete loss if the planet warms between 2-3 degrees (B. Hare 2005). Affecting the community structure and impacts biota through the food chains and loss of habitat. The ecological responses to increased salinity and success of the wetland will be dependent on the tolerance of the individual species D. Nielsen Increase of Temperature and Changes in Precipitation: Temperature increase has a large effect on aquatic communities most basically as the higher the temperature the less oxygen molecules (N. Campbell 2009). However, much more complex on a larger scale, such as the rise in temperature increasing evaporation of rivers and decreasing snow and rainfall. Predictions of increased drought frequencies have fatal implications for inland wetlands, for example increased evaporation and up to 10% reduced rainfall in the Macadamia Valley mean annual flows to the Marshes will be reduced by 11-32%. The Macadamia Marshes are one of the largest semi-permanent wetlands in south-eastern Australia, with 42 species of waterbeds, including Magpie Geese and Prologs.

Climate change is likely to cause a decline in the wetlands vegetation by up to 40 percent which will mean a much smaller capacity to sustain life and it is unclear where the water birds will be able to go as the Macadamia Marshes is one of the only wetlands in the Murray Darling Basin (L. Hughes

2003). 2009). The species most tolerant to the new saline environment will recession the area, changing the future face of the wetland permanently.

There are many management issues and risks as this succession on a changed environment opens the area to possible weed invasion which further decreases long term biodiversity of Australia's water ways (T. Smith 2009). Future plans show new modeling techniques being developed to predict the outcomes of salinity increase scenarios, setting salinity maxima limits for wetlands, and identifying the species potentially suitable as early warning indicators of a declining wetland or to aid in resilience in restoration.

This knowledge will facilitate preventative, rather than reactive, wetland management (Arthur Relay Institute 2010). MANAGEMENT In Australia individual State and territory governments have the primary legislative and policy responsibility for wetland management. Australia was the first country to join the Rams Convention in 1971 " an intergovernmental treaty that embodies the commitments of its member countries to maintain the ecological character of Salinity: Climate change will increase salinity in wetlands through evaporation and rising of the ground water table due to loss of vegetation and flooding.

A decrease in rain and flow in many regions will not allow the seasonal flushing of salt from wetlands and it will accumulate over time drastically changing the Truckee and quality of the environment. An increase in salinity directly reduces biodiversity in aquatic systems thus their Wetlands of International Importance and to plan for the " wise use", or sustainable use, of all of the wetlands in their territories"(Wetlands 2010).

Part of Australia's commitment was the implementation of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), and through the development of programs state and nationwide with the goal to improve the management of wetlands (Department of the Environment 2009). In response to climate change, the Australian Government has developed Water for the Future, a long-term \$12.5 Billion package that proposes to take action to support our rivers and wetlands especially the Murray-Darling Basin which has suffered decades of mismanagement due to irrigation and damming (Australian Government Department of the Environment 2010). The government is now buying back water from the irrigation companies under the 'River bank program' to deliver to wetlands such as the Macadamia Marshes (David 2008). Must be protected and rehabilitated to assist in mitigating climate change long with our responsibility as stewards of the earth.

Given the diversity of wetland types management issues will need to be customized to both regional and local levels which pose difficulties in negotiation as people hold differing values. This disparity between wetland values and the increased demands for water will only be exacerbated in the future as the climate changes and human needs increase the strain on the environment. An important management strategy will need to be recognizing that climate change will affect the ecological characteristics of wetlands and their uses and being aware that they hold an important role in

CONCLUSION Wetlands are a critical part of the Australian environment and an important system in our waterways. They protect our shores from wave action, mitigate impacts of floods and absorb pollution to improve water

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quality and provide habitats for animals and plants both endemic to Australia and shared with other nations. Given these important functions it is clear that wetlands securing the future water quality and biological biodiversity of Australian ecosystems.