

Environmental Futures Centre

Health in a changing world: wetlands and mosquito-borne disease.

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Wetlands are indisputably important ecosystems, as evidenced by a wealth of literature spanning several decades. Many conferences, books and papers have been devoted to the subject of wetlands: their importance, threats to their integrity and management issues. However there is one organism for whom wetlands are essential: the mosquito. When wetlands with positive environmental values coincide with disease-bearing mosquitoes there is the potential for conflict. Can we manage both for mosquitoes and also sustain the environment?

Environmental Importance vs Health Issues

Wetlands are very important ecosystems, providing value to people and other organisms. Wetland functions include water purification, groundwater recharge, coastal protection from extreme events, providing habitat for maintaining biodiversity, habitat for commercially valuable organisms, aesthetic value and research opportunities. Wetlands also provide habitat for disease vector mosquitoes and this creates a potential conflict for wetland management: *how to balance environmental and human health interests.*

Ross River Virus, Australia

Previous studies on RRV in Australia have shown that there is a relationship between residential location with respect to wetlands and risk of infection with mosquito borne disease.

Who is Responsible?

Mosquito management is mandatory in Queensland, under the Health Act 2005 and the responsibility lies with the local government. However who is responsible for wetland management?

Managing mosquito borne disease involves managing wetlands. At present several state government departments have interest in the health of wetlands for biodiversity, vegetation, water quality and fisheries resources. Managing wetlands in Queensland involves a multitude of laws and that there is potential for confusion as jurisdictional boundaries



are not spatially clear (due to tidal levels and potential sea level changes) and are likely to change in response to environmental change.



Mosquito Management

Mosquito management may affect the values that are important to sustaining environments on which life depends, including potentially disrupting wetland food chains. There are currently a range of methods that are being used including biological control (e.g. predatory fish), larvicides, adulticides and habitat modification. Larvicides are used in most Queensland mosquito management programs as treatment can be focussed on smaller areas. Minimal habitat modification has also been incorporated in management programs since the mid 1980's and involves 'runnelling', constructing very shallow (<0.30m) channels that allow fish access to the upper marshes where mosquito larvae are numerous. Minimal habitat modification has also been recently shown to have a very minimal impact on the environment.



Impact of Climate Change

Intertidal wetlands are likely to show the first signs of climate related change impacts. There is evidence in South-east Queensland that mangroves can start to creep into salt marshes following changes in rainfall patterns and high rainfall events.

In Queensland the greatest risks will come from salt marsh mosquito habitats moving closer to human habitation and the more rapid development of mosquitoes and extended mosquito activity season due to temperature increases. It is likely that diseases such as Ross River Virus will increase and malaria could become a problem. Permafrost areas are not currently shown in global mosquito-borne disease distribution maps but could quickly become important habitats for mosquitoes if the permafrost melts to become freshwater wetlands as a result of global warming.

Conclusions

Addressing the issue of mosquito-borne disease and wetland management is becoming urgent as the environment changes. The complex system of management requires an interdisciplinary approach and understanding of not only the biophysical systems but also the social and legislative context in which they are embedded. Adaptive management techniques will be complex, involving statutory bodies and their physically changing jurisdictional boundaries, changing wetland systems, development pressures bringing people closer to mosquito habitats (as well as habitats perhaps moving towards human settlements), mosquito management and human health resource issues.

