Mosquito densities are significantly positively correlated with tree densities

ABSTRACT

This project will investigate how mosquito community dynamics are affected by tropical deforestation and fragmentation.

Land use changes, including deforestation, agriculture, and urbanization, have coincided with an increase in vector-borne diseases worldwide. Land use changes may alter mosquito populations by modifying the characteristics of aquatic larval habitats, but we still poorly understand the physical, chemical, and biological factors involved.

Samples were collected from urban land and pastureland compared to native forest. Urban land and pastureland habitats were mostly artificial containers compared to ground pools in native forest. Generalized linear modeling (GLM) revealed nine environmental variables that were significantly different between land uses. Of these variables, mosquito density was significantly (positively) correlated with bacteria and dissolved organic carbon.

When location and date were controlled for in GLM, mosquito density was (negatively) related to the presence of vegetation and combined predators.

Urban containers and stock drinking troughs had high mosquito densities, suggesting that an initial step in directing control operations should be to focus on these habitats.

INTRODUCTION

Land use changes, including deforestation, agriculture, and urbanization, are considered to be the greatest drivers of terrestrial environmental change and have often coincided with increases in the range of mosquito-borne diseases worldwide.

Human activities can be responsible for fundamental changes to the physical, chemical, and biological characteristics of mosquito larval habitats that may cause increased female ovi position and larval survival.

For example, deforestation can promote increased mosquito productivity by allowing substantially higher levels of solar radiation reach larval habitats, thus speeding up the rate of larval growth. Deforestation and agriculture can also alter mosquito populations by increasing detrital and microbial biomass on which mosquitoes feed as a result of livestock waste, fertilizer run-off and increased detrital decomposition with warmer temperatures.

However, the relationship of these predators with land use and mosquito populations has not been examined. In general, studies of the relationship between land use and mosquitoes have suggested that the proliferation of new larval habitats, such as dam creation from water development projects and artificial containers from urbanization, is the primary mechanism by which land use change has increased mosquito productivity. Fewer studies have examined

the influence of land use on the environmental characteristics of larval habitats and the ecological factors involved.

OBJECTIVES & ANALYSES

Land use changes, such as deforestation, urbanisation, water management and agricultural practice, are the main drivers of emerging infectious diseases (EIDs), which can result in public health and economic tolls. Each environmental change can have a significant effect on habitat quality and microclimatic conditions, which can affect vector abundance, survivorship, human biting behavior and vector competence.

What is the ecological role of mosquitoes?

My interests are the investigation of the ecological role provided by mosquitoes. What are mosquitoes "good" for anyway? Beyond the understanding that mosquitoes are food for a range of arthropods, fish, amphibians, birds, reptiles and mammals, I often wonder just how important a role mozzies may play in local ecosystems.

Mosquito management

Mosquito populations associated with constructed and rehabilitated wetlands in Australia have the potential to cause serious nuisance biting impacts but also pose significant public health risks through the transmission of arboviruses.

However, constructed and rehabilitated wetlands can play an important role in local ecosystems by providing important habitats for native flora and fauna as well as reducing the impacts of pollution. Mosquito management strategies should be, where possible, complementary to the overall objectives of wetland management.

In some cases, mosquitoes associated from nearby habitats may cause pest impacts in and around a constructed or rehabilitated wetlands and it is important that such a situation is quickly identified to prevent unnecessary insecticide or habitat modification interventions. If a "mosquito problem" is identified, mosquito control in the closest wetland is not always the most effective course of action.

METHODOLOGY OF MOSQUITO CONTROLLING

INTEGRATED PEST MANAGEMENT

It is important that mosquito control agencies maintain a broad selection of tools, both chemical and non-chemical, to use in managing mosquito populations in Florida. It is also important that the potential impacts to both natural communities and to humans are understood sufficiently to help in risk/benefit analysis that can result in informed decision-making.

The most effective and environmentally sound pest control programs are based on a combination of methods including source reduction, chemical control, and biological control. Using a combination of these techniques is termed Integrated Pest Management (IPM).

MOSQUITO CONTROL INSECTICIDES: PAST AND PRESENT

There are steps you can take to reduce mosquito populations without using insecticides. Here are some tips to consider when trying to avoid mosquito bites:

1. Empty water from containers such as flower pots, birdbaths, pet water dishes, cans, gutters, tires and buckets regularly to disrupt the mosquito breeding cycle.
2. Keep windows and door screens in good working order to prevent mosquitoes from entering your home.
3. If possible, wear long-sleeved shirts and long pants while outdoors, consider staying indoors early in the morning and evening when mosquitoes are most active.
4. Maintain your swimming pool to prevent mosquito breeding, and report abandoned pools to your local health department.
5. Use mosquito netting over infants carriers when infants are outdoors.
6. Consider using an insect repellent, be sure to follow the label directions for applying the repellent. For help selecting a mosquito repellent, try our Insect Repellent Locator.

Insecticides can also be used to help control mosquitoes. Some products are designed to be applied directly to water to control mosquito larvae, while others are used more broadly to control adult mosquitoes.

Some community agencies provide mosquito control as a service to the public and may apply pesticides by trucks or planes. Visit the links below to get more information about how to control mosquitoes.

EFFECTS OF MOSQUITO POPULATION CONTROL

Mosquito control manages the population of mosquitoes to reduce their damage to human health, economies, and enjoyment. Mosquito control is a vital public-health practice throughout the world and especially in the tropics because mosquitoes spread many diseases, such as malaria.

Mosquito-control operations are targeted against three different problems:

- Nuisance mosquitoes bother people around homes or in parks and recreational areas;
- Economically important mosquitoes reduce real estate values, adversely affect tourism and related business interests, or negatively impact livestock or poultry production;
- Public health is the focus when mosquitoes are vectors, or transmitters, of infectious disease.

Biological control or "biocontrol" is the use of natural enemies to manage mosquito populations. There are several types of biological control including the direct introduction of parasites, pathogens and predators to target mosquitoes. Effective biocontrol agents include

predatory fish that feed on mosquito larvae such as mosquito fish (Gambusia affinis) and some cyprinids (carps and minnows) and killifish.

CONCLUSION

Some biologists have proposed the deliberate extinction of certain mosquito species. Insect ecologist Steven Juliano has argued that it's difficult to see what the downside would be to removal, except for collateral damage. Entomologist Joe Conlon stated that "If we eradicated them tomorrow, the ecosystems where they are active will hiccup and then get on with life. Something better or worse would take over."