Aquatic Weed Impact to Public Health

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Abstract

Aquatic and riparian regions are ecosystems that are heavily dependent on an available water source; there is a wide array of organisms that are dependent on these regions for development and survival. As species become prevalent, either invasive or endemic species, they pose a risk to these regions and could potentially hinder the ecosystem(s). Invasive weed or native weed species can be detrimental to existing plants, animal species, as well as human populations. Invasive species and certain native plant species tend to invade and proliferate in areas becoming stressors that result in damaging effects to the development of native species and pose a health risk or hazard to surrounding organisms. The aquatic and riparian weeds have expanding populations in a wide array of aquatic related regions such as waterways in agricultural settings, ornamental horticulture areas, storm drains, reservoirs, parks, hydroelectric areas, etc. These specific weeds deplete the available space for natural aquatic plants, utilize nutrients that were commonly used by native species, change or redirect water flow, hinders the development of native species, alters the environment and food source and water supply, and pose as a human health hazard by introducing pathogens and diseases. To prevent these negative outcomes, actions can take place as preventative measures and management. Individuals who perform or need these invasive weed plants managed, must weigh the odds for cost effectiveness, long-term or short-term benefit, as well as safety to the environment and public health.

Introduction

- Aquatic and riparian weeds are fast developing and infiltrate varying types of waterways across the globe.
- Aquatic weeds are more widely dispersed throughout the world than terrestrial plants. [1]
- Native or invasive aquatic weed species can form monocultures that impair the needs of the native fauna which requires a more diverse environment. [2]
- Aquatic weeds are problematic in a variety of ways from both an ecological perspective as well as impacts to public health.

Public Health Implications: Literature Review

- Impact of Aquatic Weeds to Population and Natural Environment
- Conducive to Zoonotic Disease Transmission
- Parasitic Development
- Direct Impact to Public Health
- Toxic Conditions
- Cost-Benefit Ratio of Aquatic Weed Management


Methods

- Numerous efforts are being employed to control and or eradicate the weed population- the use of herbivorous fish, insects, pathogens, aquatic mammals, and gastropods.
- Vertebrate and Invertebrate species can be polyphagous and consume more than the target weed.
- Domestic animals or livestock should have limited
- to no access as their exposure would increase the turbidity, fertility, and tare down the banks
- Aerating the bodies of water reduces algal development
- Mechanical methods only removes the vegetative structures above sediment; underground structures remain intact.
- Prevention of organic matter or fertilizers from accessing waterways which aid in the weeds proliferating.
- If operations are not performed in accordance to set procedures, it can disrupt the native ecosystem by altering the native vegetation and flush out the vertebrates and invertebrate species.
- Further research is needed to investigate the cost-benefit to aquatic weed management to public health.



Results and Findings

- Biological Control
- Chemical Control
- Physical & Mechanical Control
- Habitat Alteration

Discussion

- Aquatic weeds can become hazardous to the health and livelihood of individuals as well as the environment.
- Can cause ecological damage, lead to human health risks, and economic losses due to management techniques and recovery from the damage. [3]
- Out-compete the local plants, reduction in biodiversity, non-stable soil conditions that causes soil erosion and degradation of waterways.
- Easily spread via natural waterways, man-made structures, motorized vehicles, animals, human activities and recreation, etc.
- Activities that form pollution are conducive to invasive (aquatic) weed development as the pollutants alter the environmental conditions; this makes the niche or microclimate less favorable native species which allows for non-native species to emerge in the area.
- Prevalence of aquatic vegetation is commonly associated with human activities such as the creation of reservoirs or canals. [4]
- Prevention eliminates or limits weeds into riparian areas whereas containment methods are used to restrict weed encroachment of infestations. [5]
- Economic cost of weed abatement technologies significantly reduces risk; weed abatement costs versus risk hazard and recovery from no management. [6]

Conclusion

- Aquatic weeds impact public health across the world; these vegetative organisms impair not only ecosystems but, the livelihoods of individuals.
- These types of plants create conditions that impair actions or movements to waterways that pose as a health risk, condone parasitic development, increase the risk zoonotic disease transmission to the population, impair water quality, and create toxic conditions that could be lethal.
- There are numerous control methods being employed to control the aquatic weed development such as- biological control, cultural control, mechanical control, and in worse scenarios chemical control.

References

[1] Aloo, P., Ojwang, W., Omondi, R., Njiru, J. M., & Oyugi, D. (2013). A review of the impacts of invasive aquatic weeds on the biodiversity of some tropical water bodies with special reference to Lake Victoria (Kenya). *Biodiversity Journal*, 4 (4): 471-482
[2] Gettys, L. (2019). Breaking Bad: Native Aquatic Plants Gone Rogue and the Invasive Species That Inspire Them. *HortTechnology*, 29(5) 559-566. https://doi.org/10.21273/HORTTECH04333-19
[3] McCormick F.H., Contreras, G.C., & Johnson S.L. (2010). Effects of nonindigenous invasive species on water quality and quantity. In: Dix M, Britton K, editors. A dynamic invasive species research vision: opportunities and priorities. 2009–29.
[4] Charudattan, R. (2014). Are We On Top Of Aquatic Weeds? Weed Problems, Control Options, And Challenges.
https://www.researchgate.net/publication/228964598_Are_we_on_top_of_aquatic_weeds_Weed_problems_control_options_and_challenges
[5] Sheley, S. L., B. H. Mullin, and P. K. Fay. 1995. Managing Riparian Weeds. *Rangelands*. 17:5 https://journals.uair.arizona.edu/index.php/rangelands/article/viewFile/11260/10533
[6] Rockwell, H. W. (2003). Summary of a Survey of the Literature on the Economic Impact of Aquatic Weeds.*The Economic Impact of Aquatic Weeds*. http://aquatics.org/pubs/economic_impact.pdf

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