

## Abstract: Third International Conference on Ecological Sanitation

<b>Title</b>	<b>Role of wastewater stabilization ponds in the generation of vector mosquitoes of public health importance: a case study from Faisalabad, Pakistan</b>
<b>Keywords</b>	Wastewater stabilization ponds, irrigation, mosquito breeding, human health Pakistan
<b>Author(s)</b>	<b>Muhammad Mukhtar</b> <sup>1</sup> , Felix P. Amerasinghe <sup>2</sup> , H.J. Ensink <sup>4</sup> , Wim van der Hoek <sup>2</sup>
<b>Address</b>	<sup>1</sup> International Water Management Institute (IWMI), Lahore, Pakistan <sup>2</sup> IWMI, PO Box 2075, Colombo, Sri Lanka <sup>4</sup> IWMI, South Asia Regional Office, Hyderabad, India
<b>Telephone</b>	92-42-5410050-3
<b>Fax</b>	92-42-5410054
<b>Mobile</b>	92-300-4515897
<b>E-mail</b>	<a href="mailto:m.Mukhtar@cqiir.org">m.Mukhtar@cqiir.org</a>
<b>Abstract ID no</b>	M/2

### Role of wastewater stabilization ponds in the generation of vector mosquitoes of public health importance: a case study from Faisalabad, Pakistan

Wastewater use in agriculture has become a widely established practice in arid and semi-arid countries because it provides dual benefits of water and nutrients for crops. The health hazards relating to intestinal diseases resulting from this practice are well known, however the potential role of wastewater stabilization ponds system in the generation of vector mosquitoes of public health importance received very limited attention. The objective of the present study was to investigate the health risks associated with vector mosquitoes breeding in a wastewater stabilization ponds system at a site on the outskirts of Faisalabad City, Pakistan. Wastewater stabilization ponds were classified as anaerobic and facultative depending upon the stage of treatment. Fortnightly mosquito larval collections were made from July 2001 to June 2002. Samples were characterized according to exposure to sunlight, substratum, water flow, presence of vegetation, fauna (predators & non-predators), physical water condition (turbid/foul-smelling & clear/foul-smelling). Water temperature, dissolved oxygen (DO), electro-conductivity (EC) and hydrogen ion concentrations (pH) of habitats were also recorded *in situ*. Additionally, the samples were also analyzed for BOD (Bacterial/Biological Oxygen Demand), nitrates (NO<sub>3</sub>), phosphate (P<sub>2</sub>O<sub>4</sub>), ammonia (NH<sub>3</sub>) concentration and potassium (K) levels on monthly basis. A total 2016 collected samples yielded 598,076 *Culex* larvae of five species, viz., *Culex quinquefasciatus* (67.83%), *Cx. tritaeniorhynchus* (22.84%), *Cx. pipiens* (7.64%), *Cx. pseudovishnui* (0.89%) and *Cx. bitaeniorhynchus* (0.79%). Also 40,171 anophelines larvae were collected representing six *Anopheles* species viz., *Anopheles subpictus* (54.86%), *An. stephensi* (36.24%), *An. culicifacies* (5.51%), *An. peditaeniatus* (1.40%), *An. nigerrimus* (1.00%) and *An. pulcherrimus* (1.00%). A well defined difference of physio-chemical characteristics and mosquito species abundance between anaerobic and facultative ponds was also observed. The anaerobic ponds were characterized by turbid/foul-smelling, low levels of DO, EC and dominantly occupied by *Culex* mosquitoes. Facultative ponds were characterized by clear/foul-smelling, high levels of DO, EC and favored the breeding of both *Anopheles* and *Culex* mosquitoes. No significantly association of water temperature and pH with mosquito population was observed. Nutrient related chemistry data of wastewater stabilization ponds also explained the association of different vector species with different water quality ponds. The

occurrence of *Cx. quinquefasciatus*, *Cx tritaeniorhynchus*, *Cx. pipiens* and *An. subpictus* in anaerobic ponds was highly correlated with high levels of BOD, Nitrate ( $\text{NO}_3$ ), ammonia ( $\text{NH}_3$ ) and Phosphate ( $\text{P}_2\text{O}_5$ ) and low levels of potassium (K). The prevalence of potential vectors of human diseases such as *An. stephensi* and *An. culicifacies* (malaria), *Cx. quinquefasciatus* and *Cx. pipiens* (Filariasis, West Nile fever), and *Cx. tritaeniorhynchus* (West Nile fever, Japanese encephalitis) indicated that wastewater stabilization ponds could contribute to vector-borne disease risks in addition to other associated health risks for poor human communities that living around these ponds and depend on wastewater reuse for their livelihoods. Wastewater stabilization and disposal systems provide a perennial source of water for vector mosquitoes of human diseases. Present study will help national health planners and other policy makers to take better informed decisions on whether scarce resources should be invested in such wastewater treatment systems in semi-arid countries like Pakistan. Finally, it also emphasizes the need to develop appropriate environmental and water management methods for disease vector control.