Surface runoff is a major process of contaminants transfer as a significant portion of pesticides applied to agricultural fields can move into aquatic ecosystems during rainfall-runoff events. Buffer zones, such as wetlands, can collect contaminated runoff from agricultural catchments and have intrinsic physical, chemical and biological retention and removal processes useful for mitigating mixtures of pesticides, and thus limiting the contamination of aquatic ecosystems.

The objective of the present study was to assess the ability of a stormwater wetland to remove a mixture of pesticides in runoff from a vineyard catchment during the period of pesticide application (April to September 2009). In particular, we evaluated the relationships between pesticide removal and changes of hydrochemical characteristics and flow conditions. Besides, the ability of the stormwater wetland to remove pesticide mixtures in runoff was compared during two periods of pesticide application (April to June 2009 and 2010).

**RESULTS / DISCUSSION**

April to September 2009

- **Hydrochemical variability in the stormwater wetland**
  - Changes of the hydrochemical conditions in the stormwater wetland between April and September 2009 (fig. 1).
  - **OXIC** during spring
  - **ANOXIC** during summer
  - Vegetation cover 10%

- **Mass balances of pesticides and solids passing through the wetland**
  - No seasonal changes
  - Low Kd values
  - High trapping efficiency
  - Possible transfer as DOC-associated pesticides

**Comparison between April to June 2009 and 2010**

Rainfall and runoff patterns globally were similar between the April to June 2009 and 2010 periods. The overall load removal of pesticides was 81% in 2009 and 92% in 2010 (table 3). Despite the larger pesticide load entering the wetland in 2010 compared to that in 2009, the removal ability of the wetland was not affected. However, load removal rates largely differed according to the individual compounds. The calculation of sedimentation rates revealed that the wetland retained 78% (3.5 kg d⁻¹) of the input mass in 2009 and 97% (5.9 kg d⁻¹) in 2010. This clearly indicates that the wetland acts as a sink for particle-laden pesticides.

**CONCLUSION**

- This study demonstrates that stormwater wetlands collecting agricultural runoff have good capacities for retaining, at various flow conditions and loadings, mixtures of pesticides with different physico-chemical properties.
- Our findings also underscore the pivotal role of vegetation in retaining moderately hydrophobic compounds.
- Though the use of stormwater wetlands as a management practice targeting pesticide mitigation should not be conceived as a unique solution to treat pesticide runoff, in many cases where other best management practice are not available, the introduction and maintenance of a vegetation cover in stormwater detention systems can be an effective practice to reduce the transfer of contaminants from land into water bodies.

**REFERENCES**