ASSESSING THE IMPACT OF LAND USE ON WATER QUALITY USING MACROINVERTEBRATA IN THE UPPER WAY BESAI CATCHMENT

I. Suryadi, B. Verbist, A. Mouton, A. Dedecker, V. Stuer, K. De Ridder, D. Warto, Susanto

GHENT UNIVERSITY

Macro-invertebrata are invertebrate animals visible to the naked eye (> 0.5 mm), such as insects, worms, crustacean. Various groups of macroinvertebrates have different tolerance to variations in water quality and can thus be used as indicator.

Overall biological water quality in the upper Way Besai catchment (43,000 ha upstream of the Hydro-Powerhouse) is quite good, with a BBI-index ranging between 5-10. A score of 10 points to high quality water with a high diversity and abundance of invertebrate species.

Flow of activities:
1. Rapid test of physical and chemical characteristics
2. Kick-sampling to collect macroinvertebrata
3. Picking out of macroinvertebrata
4. Identification of macroinvertebrata
5. Calculate BBI-water quality index (Belgian Biotic Index)

Introduction
Deforestation is often blamed as a main culprit for decreasing water quality. About 20% of the State Forest land in Indonesia is classified as ‘protection forest’ in order to safeguard water quality. Also in Sumberjaya (sometimes violent) evictions took place in order to ‘safeguard’ the watershed. This study aims to assess the impact of land use on the biological water quality.

Method
In the upper Way Besai catchment 28 sample points were selected and sampled in September 2003, April and August 2005. Three subcatchments (Way Ringkhi, Way Petai and Air Hitam) representative of the land use types in the upper Way Besai were sampled in more detail.

Results

<table>
<thead>
<tr>
<th>BBI score</th>
<th>Color</th>
<th>Water quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-9</td>
<td>6</td>
<td>Very good</td>
</tr>
<tr>
<td>8-7</td>
<td>5</td>
<td>Good</td>
</tr>
<tr>
<td>6-5</td>
<td>4</td>
<td>Moderate</td>
</tr>
<tr>
<td>4-3</td>
<td>3</td>
<td>Bad</td>
</tr>
<tr>
<td>2-1</td>
<td>2</td>
<td>Very Bad</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>Biologically dead water</td>
</tr>
</tbody>
</table>

Overall biological water quality is quite good, with a BBI-index ranging between 5-10. A score of 10 points to high quality water with a high diversity and abundance of invertebrate species.

Conclusions
- Overall water quality reduces towards the downstream part. At some points however this trend is not confirmed and some self-cleaning takes place (Powerhouse and 2 points in the middle section of Way Petai).
- There seems to be a correlation with lower BBI-scores and areas with paddy rice where pesticides and fertilisers are extensively used (Tebu, lower Way Ringkhi and Way Petai).
- Catchments with almost no forest cover left (Air Hitam, Way Campang) have the highest BBI-scores. Fast-flowing water, a stoney river bed, intact riparian areas and the absence of high rates of pesticides and fertiliser seem more important than the forest area in a catchment.
- This study did not assess sediment load.

Acknowledgments
The Flemish Interuniversity Council (VLIR), ICRAF and RUPES kindly provided financial support to carry out this study.