



GHEENT UNIVERSITY



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TRANSFORMING LIVES AND LANDSCAPES

ASSESSING THE IMPACT OF LANDUSE ON WATERQUALITY USING MACROINVERTEBRATA IN THE UPPER WAY BESAI CATCHMENT

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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 Ringkih, Way Petai and Air Hitam) representative of the land use types in the upper Way Besai were sampled in more detail.



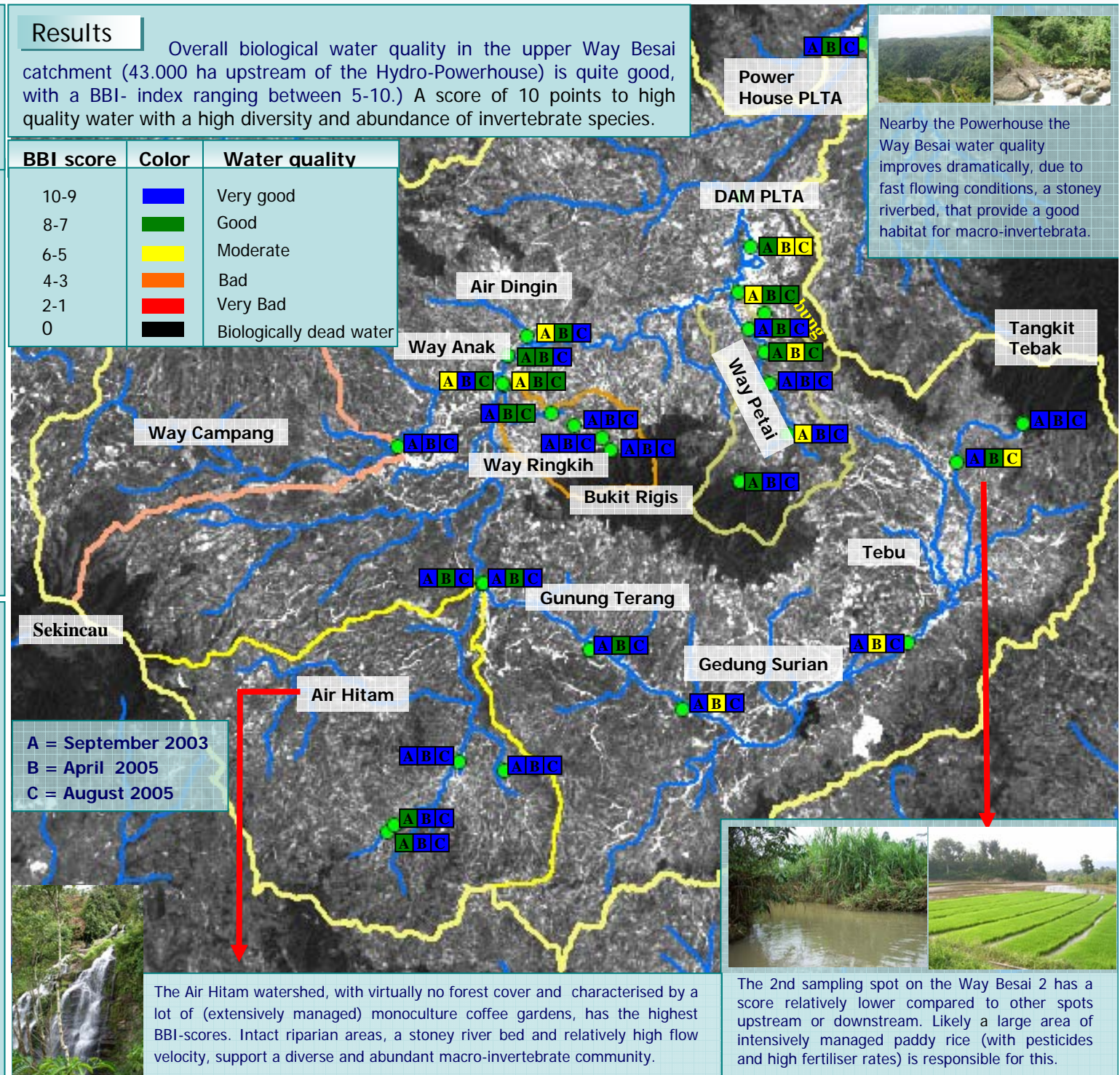
Flow of activities:

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- waterquality index (Belgian Biotic Index)

Results

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.

BBI score	Color	Water quality
10-9	Blue	Very good
8-7	Green	Good
6-5	Yellow	Moderate
4-3	Orange	Bad
2-1	Red	Very Bad
0	Black	Biologically dead water



Nearby the Powerhouse the Way Besai water quality improves dramatically, due to fast flowing conditions, a stoney riverbed, that provide a good habitat for macro-invertebrata.

A = September 2003
B = April 2005
C = August 2005

The Air Hitam watershed, with virtually no forest cover and characterised by a lot of (extensively managed) monoculture coffee gardens, has the highest BBI-scores. Intact riparian areas, a stoney river bed and relatively high flow velocity, support a diverse and abundant macro-invertebrate community.

The 2nd sampling spot on the Way Besai 2 has a score relatively lower compared to other spots upstream or downstream. Likely a large area of intensively managed paddy rice (with pesticides and high fertiliser rates) is responsible for this.



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

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 Ringkih 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.

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