Community conservation index is more precise than the stress-sensitive macroinvertebrate index for freshwater conservation evaluation

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Introduction: Globally, freshwater ecosystem conservation studies are underreported, especially when compared with terrestrial and marine ecosystems. Among the indices popularly used for freshwater ecological studies is the stress-sensitive Ephemeroptera-Plecoptera-Trichoptera (EPT) index, which is directly related to high-quality freshwater systems. In the current study of six freshwater systems along the Nigeria-Cameroon border, the Community Conservation Index (CCI) provided a better evaluation of freshwater conservation than the EPT index.

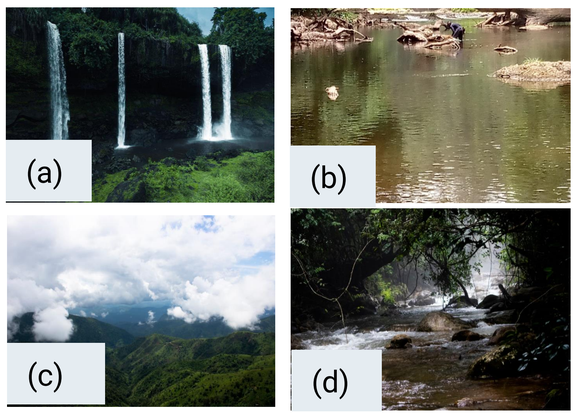


Fig. 1: Field images (a) Agbokim Waterfalls, Cross River State (b) Kwa River of Cross River National Park (c) Obudu Mountains (d) Afundu stream of Obudu Mountains

Methods

- Three natural sites selected for the study (Fig. 1).
- Four streams in Obudu Mountains: Afundu, Cataract, Becheve Nature Reserve, and Grotto.
- Agbokim River at Agbokim Waterfalls (Fig. 2).
- Kwa River of the Cross River National Park (Fig. 2)
- Conservation score (CS) allocated to each identified species (Table 1).
- Total conservation score (TCS) calculated for each site.
- TCS is divided by the number of contributing species.
- The value is then multiplied by the community score (CoS) (Table 2).
- CCI > 20.0 = very high conservation value(CV), CCI > 15.0-20.0 = high CV, CCI > 10.0-15.0 = fairly high CV, CCI >5.0-10.0= moderate CV, CCI 0-5.0 = low CV (Chadd and Extence, 2004; Chadd, 2010).

Table 1: Conservation scores for freshwater invertebrates (Chadd and Extence, 2004; Chadd, 2010)

CS	Definition
10	RDB1 (Endangered)
9	RDB2 (Vulnerable)
8	RDB3 (Rare)
7	Notable (but not RDB status)
6	Regionally notable
5	Local
4	Occasional species (species not in categories 10-5, which occur in up to 10% of all samples from similar habitats)
3	Frequent (species not in categories 10-5, which occur in > 10-25% of all samples from similar habitats)
2	Common (species not in categories 10-5, which occur in > 25-50% of all samples from similar habitats)
1	Very common (species not in categories 10-5, which occur in > 50-100% of all samples from similar habitats)

CS = Conservation score

Table 2: Community scores for freshwater ecosystem conservation evaluation (Chadd and Extence, 2004; Chadd, 2010)

CS_{max}	CoS
10	15
9	12
8	10
7	7
5 or 6	5
3 or 4	3
1 or 2	1
Scoring taxa absent	0

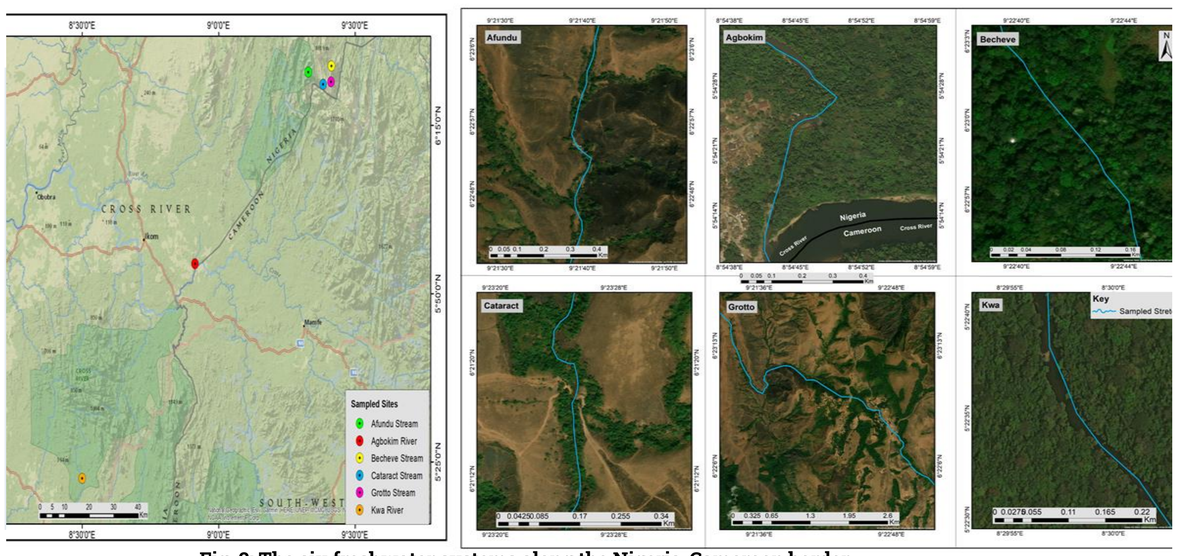


Fig. 2: The six freshwater systems along the Nigeria-Cameroon border

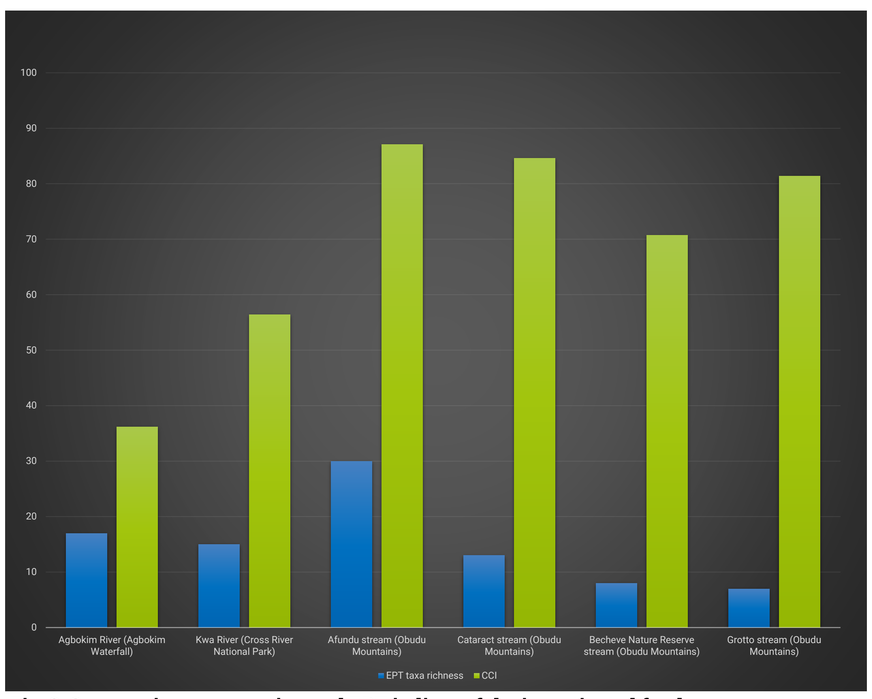


Fig. 3: Community conservation and EPT indices of the investigated freshwater systems along the Nigeria-Cameroon border

Results and Discussion

- All the sites had very high CVs (CCI > 20.0)
- Afundu stream of Obudu Mountains had the highest EPT taxa richness and highest CV (Fig. 3).
- Three streams in the Obudu Mountains had higher CVs than the Agbokim and Kwa Rivers, despite both rivers having higher EPT taxa richness (Fig. 3).
- The high CVs of Obudu sites are attributed to the presence of endangered invertebrates (damselflies) (Tables 1 and 2).
- The endangered species at Obudu sites were *Allocnemis vicki* (Clausnitzer, 2020) and *Africocypha centripunctata* (Clausnitzer and Dijkstra, 2018) (Fig. 4).
- The species are endemic to the Nigeria-Cameroon border region (Clausnitzer and Dijkstra, 2018; Clausnitzer, 2020).
- Such species deserve the utmost conservation attention as they can be easily exterminated due to their small global distributions (Hambler and Canney, 2013).

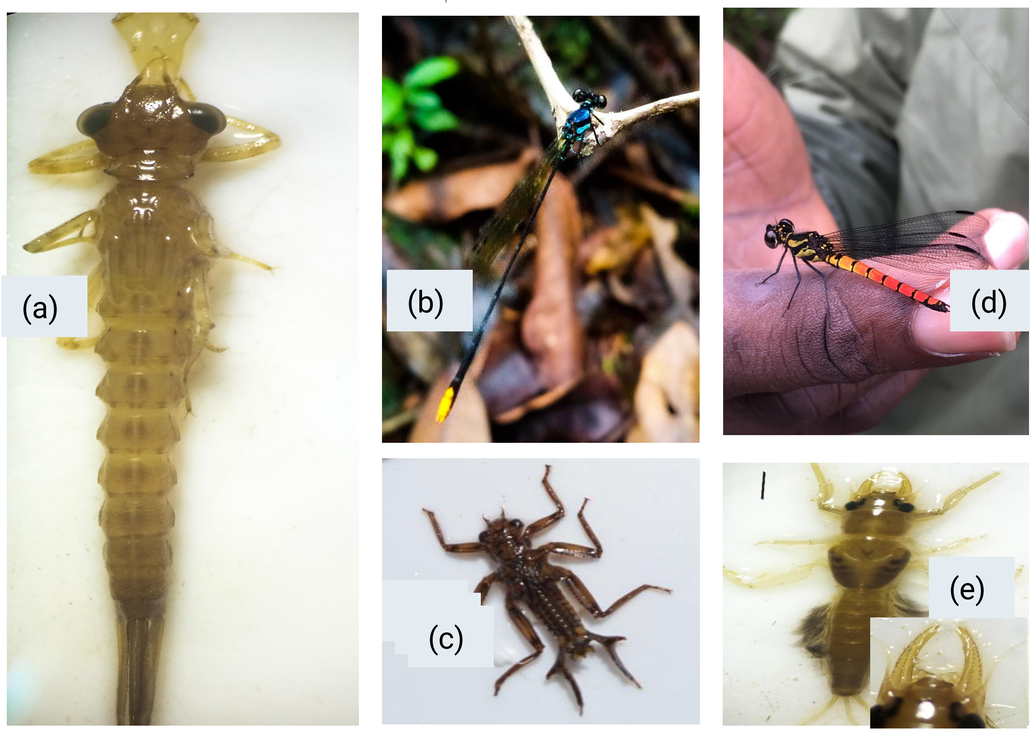


Fig. 4: Some notable macroinvertebrate species in the study areas (a) *Allocnemis vicki* larva at Becheve Nature Reserve stream of Obudu Mountains (b) *A. vicki adult* (EN) at Becheve Nature Reserve stream (c) *Africocypha centripunctata* (EN) of the Obudu Mountains (d) Pentaphlebia larva of Afundu stream (e) Ephoron savignyi of Cross River National Park, a rare record in Nigeria

Contact

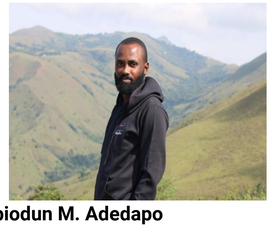


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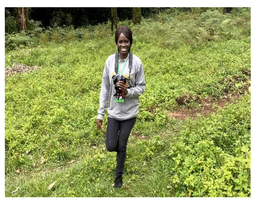
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More information