Insects

Impacts from urbanization impose stress on the environments of stream invertebrates[1,2,3]. Stressors of habitat loss, degradation of water quality, and river flow variability are associated with interbasin urban development.

Invertebrate Ecological Significance

Disruption of invertebrate life cycles reduces taxonomic richness[4,5]. Dysfunctional invertebrate communities impact the stability of aquatic environments[6,7]. Assessing the health of a river ecosystem is often monitored by assessing stream invertebrate populations and emporal comparisons of invertebrate assemblages reveal positive or negative trends to shape water management policy[8].

Table 12 lists the orders that are least tolerant to pollution. The current total number of taxa is 105, which is double the number of taxa found in local reference stream data from Bayer et al[9].

Human Land Use Impact

Figure 27 shows the relative abundance of macroinvertibrates collected in three sections of the Blanco River. This indicates substantial levels of invertebrate biodiversity. High levels of invertebrate biodiversity are usually associated with high habitat heterogeneity[10]. Habitats

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[2] McKinney, M. L. 2002. Urbanization, Biodiversity, and Conservation. BioScience: Vol 52:883-890.
[3] Brasher, A. M. D. 2003. Impacts of Human Disturbances on Biotic Disturbances in Biotic Communities in Hawaiian Streams. BioScience: Vol 53:1052-1060.
[4] Ebersole, J. L., W. J. Liss, and C. A. Frissell. 1997. Restoration of Stream Habitats in the Western United States: Restoration as Reexpression of Habitat Capacity. Environmental Management: Vol 21:1-14.
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[6] Tilman, D. 1999. The Ecological Consequences of Changes in Biodiversity: A Search for General Principles. Ecology: Vol 80:1455-1474.
[7] Covich, A. P., M. C. Austen, F. Barlocher, E. Chauvet, B. J. Cardinale, C. L. Biles, P. Inchausti, O. Dangles, M. Solan, M. O. Gessner, B. Statzner, and B. Moss. 2004. The Role of Biodiversity in the Functioning of Freshwater and Marine Benthic Ecosystems. BioScience: Vol 54:767-775.
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[9] Bayer, C. W., J. R. Davis, S. R. Twidwell, R. Kleinsasser, G. Linam, K. Mayes, and E. Hornig. 1992. Texas aquatic ecoregion project: an assessment of least disturbed streams (draft). Texas Parks and Wildlife Department, Austin.
[10] Vinson, M. R., and C.P. Hawkins. 1998. Biodiversity of stream insects: variation at local, basin and regional scales. Annual Review of Ecology and Systematics: Vol 43:271-293.

impacted by increased urbanization often exhibit invertebrate homogenization[4,11]. The Blanco River's highly diverse invertebrate composition is likely due to minimal impacts from recent and current land use changes and development.

Future management activities critical to maintaining this biodiversity and resulting ecosystem functioning must include land use management strategies that minimize instream water quality degradation.

Table 12 Sampled Macroinvertebrate Taxonomic Composition of the Blanco River from October 2003-August 2004 (Arsuffi and Pendergrass 2005).

Insects (EPT)	*Insects (Diptera)*	*Insects (Other)*	*Non-Insects*
Ephemeroptera (mayflies)	Calamoceratidae	Odonata (dragon/damselflies)	Nematamorpha
Ephemeridae	Chironomidae	Calopterygidae	
Tricorythidae	Simuliidae	*Calopteryx*	Nematoda
Tricorythodes	Tabanidae	*Hetaerina*	
Leptohyphes	Stratiomyidae	Coenagrionidae	Platyhelminthes
Caenidae	Culicidae	*Argia*	Turbellaria
Caenis	Ceratopogonidae	*Enallagma*	
Heptageniidae	Tipulidae	*Amphiagrion*	Annelida
Stenonema	Empididae	Gomphidae	Oligochaeta
Isonychiidae		*Phyllogomphoides*	Hirudinea
Isonychia	Sum=9	*Erpetogomphus*	
Leptophlebiidae		Libellulidae	Arachnida
Neochoroterpes		*Nannothemis*	Hydrachnida
Paraleptophlebiidae		Corduliidae	
Thraulodes		*Epitheca*	Pelecypoda
Choroterpes		*Macromia*	Corbiculiidae
Traverella		Aeshnidae	
Baetidae			Gastropoda
Fallceon		Coleoptera (beetles)	Lymnaeidae
Procloeon		Elmidae	Planorbidae
Camelobaetidius		*Macrelmis*	Physidae
Paracloeodes		*Neoelmis*	
Baetodes		*Stenelmis*	Crustacea
Centroptilum		*Microcylloepus*	Amphipoda
Barbaetis		*Rhizelmis*	Cambaridae
Callibaetis		*Dubiraphia*	Conchostraca
Apobaetis		*Cylloepus*	Cladocera
		Heterelmis	Copepoda
Plecoptera (stoneflies)		*Narpus*	
Perlidae		Dryopidae	Sum=16
Perlesta (Banks)		*Postelichus*	
		Helichus	
Trichoptera (caddisflies)		Lutrochidae	
Philopotamidae		*Lutrochus*	
Chimarra		Gyrinidae	
Dolophilodes		Haliplidae	
Polycentropodidae		*Peltodytes*	
Polycentropus		Dytiscidae	
Polyplectropus		*Celina*	
Glossosomatidae		Hydrophilidae	
Anagapetus		*Hydrobius*	
Hydroptilidae		*Berosus*	
Hydroptila		Psephenidae	
Ochrotrichia		*Ectopria*	
Oxyethira			
Neotrichia		Hemiptera (true bugs)	
Mayatrichia		Corixidae	
Hydropsychidae		*Trichocorixa* (Kirkaldy)	
Cheumatopsyche		Belostomatidae	
Hydropsyche		Naucoridae	
Leptoceridae		*Ambrysus* (Stal)	
Mystacides		*Cryphocricos*	
Oecetis		Pleidae	
Nectopsyche		Notonectidae	
Helicopsychidae		Veliidae	
Helicopsyche		*Rhagovelia* (Mayr)	
Hydrobiosidae		Gerridae	
Atopsyche		*Metrobates* (Uhler)	
Limnephilidae		*Trepobates* (Uhler)	
		Macroveliidae	
Sum=39		*Macrovelia* (Uhler)	
		Megaloptera (dobsonflies)	
		Corydalus	
		Lepidoptera (moths)	
		Pyralidae	
		Sum=41	

[11] Paul, M. J., and J. L. Meyer. 2001. Streams in the urban landscape. Annual Review of Ecology and Systematics: Vol 32:333-365.

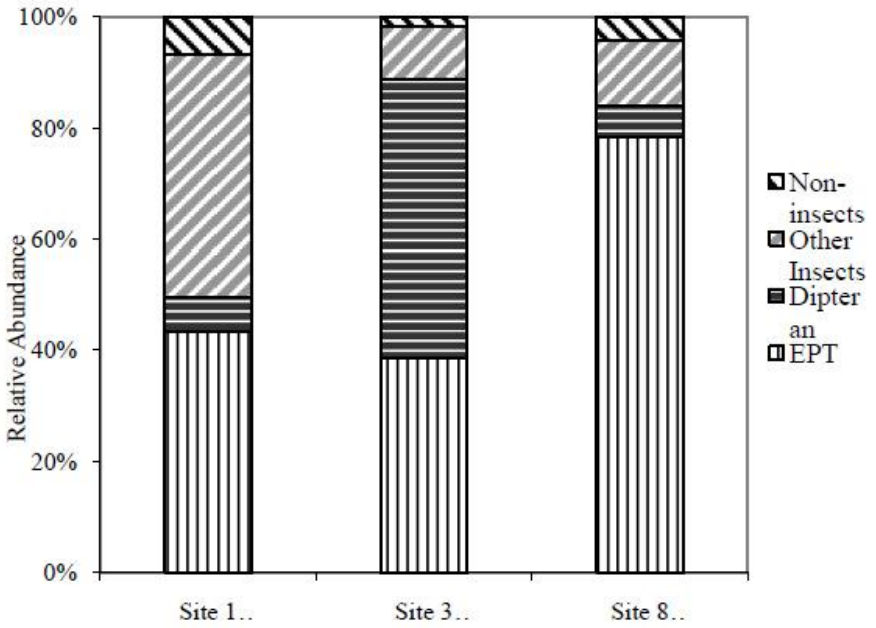

Figure 27 Relative Abundance of Macroinvertebrates Collected from Three Sites (up-, mid-, and downstream) in the Blanco River, January, 2004. Total n = 813 (Arsuffi and Pendergrass 2005).