



Urbanization Overview

Urban – of, pertaining to, or designating a city or town

- Threatens over 1/3 of world's known amphibian species
- Habitat loss, destruction, and isolation
- Decrease in species richness, abundance

Hamer et. al. 2008

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Urbanization Overview Cont.

- Introduction of foreign pathogens
- Invasive comp. & predators
- Pollution, enormous loss of biomass

Chiruluppress/Getty Images

- 88% of all threatened amphibians impacted by urbanization
- 21% of amphibians endangered
- Birds and small mammals – 10, 5%
- 23% “insufficient data”
- Estimated 1 in every 3 species listed under IUCN Red List

Hamer et. al. 2008

Habitat Loss and Destruction

- Urbanization eliminates/fragments populations and habitat
- Migration limited/non-existent
- Generalist typically best-suited
- Ephemeral pond-breeding amphibians most impacted
 - Most susceptible to pollution, soil drainage, destruction Hamer et. al. 2008

Table 1. Distribution of native amphibians and introduced aquatic species in streams in the Santa Monica Mountains and West Hills, California.

Stream	Area developed (%) ^a	Native species ^b				Introduced species ^c		
		EXTO	HYCA	BEBO	HYRE	CRAY	RACA	exotic fishes
Long Ranch, north	0.00	X			X			
Palo Colorado Canyon	0.00				X			
Temescal Canyon	0.01	X			X			
Ballwin Canyon	0.17				X			
Big Sycamore Canyon	0.26	X	X		X			
Las Virgenes, north	0.76				X			
Wood Canyon	0.71				X			
La Jolla Canyon	0.76				X			
Basin Canyon	1.45	X			X			
Salinas Canyon	2.07	X	X		X			
Cold Creek, upper	2.55	X	X		X			
Carroll Canyon	2.91				X			
Arroyo Sequia	3.58	X	X		X			
Ramirez Canyon	5.46	X	X		X			
Serrano Canyon	5.90	X	X		X			
Trancas Canyon	4.06	X	X		X			
Deer Creek	4.56	X	X		X			
Carlsbad Canyon	5.88	X	X		X			
Zuma Canyon	6.69	X	X		X			
Newton Canyon	6.84	X	X		X			
Tuna Canyon	6.89	X	X		X			
Chocoma Canyon	7.68			X	X			
Thursa Canyon	8.20		X	X	X	X	X	X
Old Topanga Canyon	9.42		X	X	X			X
Long Ranch, south	10.79		X	X	X			
Topanga Canyon, Upper	11.51		X	X	X	X		
Las Virgenes, south	12.28		X	X	X	X		X
Cold Creek, Lower	12.54	X	X		X			
Topanga Canyon, Lower	12.69	X	X	X	X			
Lower Malibu Creek	14.19				X	X		X
Erbes	16.57				X	X		
Liberty Canyon	17.57				X	X		
Modena Creek, north	27.90		X	X	X	X		X
Laurel Canyon	36.77		X	X	X	X		X
Modena Creek, south	37.54		X	X	X	X		X

^aDevelopment includes industrial, commercial, residential, transportation, and floodway areas. Streams in parentheses with > 5% development are classified as urban.

^bAbbreviations: EXTO, Taricha torresii; HYCA, Hyla cadaverina; HYRE, Hyla regilla; BEBO, Bufo boreas; CRAY, Crinia; RACA, Pseudacris clarkii; RACA, Rana californica.

Riley et. al. 2005

Habitat Destruction Cont.

Problems with Artificial/Altered Habitats

- Many contain invasive fish
 - Decrease in larval abundance
- Inappropriate hydrological regimes
- Substrate & velocity changes
 - (Barrett et. al. 2009)
- Contaminated run-off
 - fertilizers, sediment, pesticides, road surface grease and oil, heavy metals



Decrease in Species Richness

- Only generalists thrive – decrease in very complex niche-dependent system
- Potential collapse of ecosystem
- Carbon cycle collapse



soundwaves.usgs.gov

Pollution

- Primary anthropogenic factor of urbanization
- Amphibians greatly impacted – osmoregulation
 - Lower survivorship; slower growth, and development rates (Hamer et.al.)
 - 100% mortality in some species (*R. sylvatica*)
 - Truncated and missing limbs linked to pollution
 - One study (MN) showed 38 pesticides (30 herbicides, 4 fungicides, 3 insecticides, and 1 metabolite)

Taylor et. al. 2005

Introduction of Pathogens

- Habitat stressors – increase susceptibility
 - Other anthropogenic factors
- Pathogen Introduction
 - Introduction of exotics - host reservoir
 - *Batrachochytrium dendrobatidis* (chytrid)
 - Ranaviruses
 - Trematodes
 - Etc.

Overview

Negative outcomes of urbanization and amphibian populations include:

- Decrease in diversity and abundance
- Stressors linked to greater susceptibility to pollution and disease
- 100% mortality rates
- Introduction of highly competitive invasives and non-natives

Questions?


