

EFFECTS OF CONVERSION OF PRIMARY FOREST TO PASTURE ON STREAM COMMUNITIES (PRELIMINARY REPORT)

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Abstract (V.V.)

We studied the effects of the conversion of primary forest to pasture on streams. We examined two pools in streams running through primary forest and pasture, and compared the characteristics of the pool beds, and abundance and diversity of benthic invertebrates. Both pools showed a predominance of Dipterans, Annelids, and Platyhelminthes. In addition, Gleopterans and Hemipterans were abundant in the forest pool, and Ephemeropterans in the pasture pool. The forest pool had a muddy bed with abundant leaf litter, few rocks, and minimal algae. The pasture pool had a rocky bed with algae and minimal leaf litter.

We planned further study, looking at 3 other pools, and estimating fish abundances and size classes, and surface insect diversities.

Introduction (G.G.)

The purpose of this study was to determine if forest conversion to pasture effects stream communities. Over the past two to three decades, mainly due to the increasing food needs of an exploding Central American population, more and more tropical forests have been cleared to provide plots for agriculture and cattle raising. Additionally, in Costa Rican, beef exports contribute sizably to the national GNP, providing further initiative for forest conversion. This forest transformation however, may change the invertebrate and fish habitats, as well, as the water chemistry of streams running through converted land. Rural peoples throughout Costa Rica draw drinking water from stream fed rivers. Stream changes caused by forest conversion could ultimately result in rendering rivers nonpalatable, if for instance, the altered conditions promoted the proliferation of water born pathogens such as malaria.

We examined streams at La Selva Biological Station, Costa Rica and compared aquatic communities and microhabitats occurring in stream pools in pasture to pools surrounded by primary forest. We hypothesized that the species composition and abundance of invertebrate and fish populations would differ between the two stream types.

Methods (A.M.)

We chose five pools (Fig. 1) in two different streams in the La Selva Biological Reserve for our study: One pool in the Sura River passing through primary forest and four pools in the Sabalo River, two through primary forest and two through pasture land. At the time of this preliminary report, only the pool on the Sura River and one of the pasture pools of the Sabalo had been studied. A pool was defined as an area within the stream that was cut off from the normal stream flow by fallen trees or small eddies along the streambed. When choosing each pool we aimed to minimize physical differences such as pool depth, width and length as well as the rate of current flow among sites. Once a site was chosen we sampled for benthic invertebrates by choosing a point in the center of the down stream end of the pool and filling a 500ml container with leaf litter and soil found in the streambed. We then took samples at 5 & 10 pace intervals upstream from the original site. We also looked for invertebrates under rocks found at each sampling site. Five rocks, greater than 10cm and less than 30cm in diameter were picked up at each sample interval. All invertebrates found on rocks were collected, in sample jars. We also measured stream flow by recording the travel time for a small plastic bottle to float a distance of five paces downstream. Three stream flow trials were performed at each site. We collected water samples at each pool for pH measurements. In our first site we attempted to catch fish with shade cloth used as a sein net. Our seining methods were ineffective and we discontinued seining.

Preliminary Results (V.V.)

We found that our seine net was very ineffective in catching fish. Sampling of benthic invertebrates produced a predominance of celeopteran larvae, dipteran larvae and pupae, hemipterans, annelids, and platyhelminthes in the primary forest stream, and a predominance of dipterans and dipteran larvae, platyhelminthes, ephemeropterans, nematodes and annelids in the pasture stream (Table 1).

The bed of the primary forest pool was clay-like with large amounts of leaf litter and detritus. There were few algae and rocks. In contrast, the pasture pool bed was rocky, with algae present on the rocks. There was noticeably less leaf litter and detritus than in the forest pool. The rate of flow of water, over a distance of 5 paces was 10 sec. in the forest pool, and 12 sec. in the pasture pool.

Future Plans (V.V.)

As our seining technique was ineffective we have abandoned this method of sampling fish populations. Instead, we have decided to make visual estimates of abundance and size classes of

fish in the pools, and to attempt to identify them to species. We also plan to set out minnow traps in the pools to aid in fish sampling. As fish also feed on surface insects we plan to estimate densities of water striders and other surface insects.

Table 1 Benthic Invertebrate Sampling at Site 1 (1° forest) and Site 2 (pasture) sampling of benthic invertebrates in a pool in a primary forest stream (sura) and in a pool in a pasture stream (sabalo) in La Selva National Park, Costa Rica, Feb. 1991.

Order (for insects)/ Phylum (for others)	No. of benthic invertebrates in stream (sura) at Site 1 (Primary forest)	No. of benthic inverts in stream (sabalo) at Site 2 (pastures)
Coleoptera (larvae)	8	1
Diptera (adults, larvae, pupae)	12	9
Hemiptera (adults)	6	—
Lepidoptera (larvae)	1	—
Ephemoptera (adult, larvae)	1	16
Trichoptera (larvae)	1	1
Plecoptera (larvae)	1	—
Odonata (adults)	2	—
Annelida	10	5
Nematoda	—	3
Platyhelminths	5	12

Figure 1 Sites chosen for stream sampling at La Selva Biological Station, Costa Rica.

