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EFFECTS OF FRESHWATER RUNOFF ON NEARSHORE TROPICAL MARINE FISHERIES

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INTRODUCTION

The marine fisheries of the Virgin Islands exist in a low nutrient ambient area nearly devoid of seasonal cues. In temperate fisheries, these seasonal cues key the reproductive efforts of the fish so that their larva appear at the best time suited to their survival and growth. In the V.I., appearance of nutrients and the timing of reproduction also appear to be related. However, instead of being keyed by seasonal changes, they may be related to a number of different factors. One prominent factor may be rain and freshwater input.

Two watersheds and bays on St. John were studied to determine the effects of freshwater runoff on local fisheries. The areas studied were Lesser Lameshur and Greater Lameshur Bays. Both of these are undeveloped areas with only one permanently inhabited dwelling. The geomorphic profiles for both watersheds are similar.

METHODS

There is an existing rain gauge and data system at the site. A weather station and tide gauge were established at Greater Lameshur Bay. A record of nutrients was kept for 3 years and oxygen and gross phytoplankton were recorded. Reproductive condition was determined on adults of common fishery species by dissection of and microscopic examination of gonads and gonadal tissue. These measurements were correlated with rainfall and with the appearance of both larval fish and phytoplankton in the bay. The amount of zooplankton and phytoplankton was determined by taking weekly samples. Ichthyoplankton was analyzed from 20 samples taken in both bays. Analysis and correlation of the data was done to show the relationship between runoff times and volumes with the reproductive condition of adults and with the appearance of food and larva forms in the bays.

CONCLUSIONS AND RECOMMENDATIONS

01. The volume and concentration of freshwater and nutrient input to the nearshore waters depend on the development history of the watershed and its geomorphology.
2. Most fish species breed indiscriminately with respect to location or environmental cues such as freshwater, tide, presence of food, etc.
3. The survival and growth of the larva fish depends on, among other things, there being food of appropriate size and type readily available from the time they hatch.
4. Therefore, the survival of the young fish, but not reproductive attempts, depends on conclusion 1 above. This provides a secondary level link of runoff quality and quantity.
5. It is possible to produce an ecosystem model to describe this system which, with refinement, could be used as a tool in planning and mangement.
6. It is recommended that V.I. planners pay close attention to any development which will alter runoff characteristics.
7. It is also recommended that a long term (at least 2 year) study be initiated to determine critical parameters and to develop fully an ecosystem model for planning.

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