Letters to the Editor

The Benzie County Ad-Visor
August 17, 1972

Crystal Lake and a few other beautiful lakes in the United States including Lake Tahoe, and Crater Lake in the west, Glen Lake and Lake Honnedaga in the east have unique hydrological and geological environments that make them naturally clear, pure and attractive. This small set of beautiful lakes have certain common characteristics. All have small drainage areas relative to the area of water surface. And all have, volumes that are large relative to their outflows and inflows. These and a few additional unusual environmental factors have made them widely known for their natural beauty. But unfortunately these same characteristics make them exceptionally fragile in their ability to withstand pollution and other environmental insults imposed by the people who are attracted to them. Many if not most lakes in the United States are robust and have substantial natural ability to assimilate man-made pollution. However, the lakes of unusual pristine clarity, Crystal Lake and its peers, have a precarious ecological balance and require special consideration if their beauty is to be preserved. Some have already been lost because of ignorance or indifference to the facts of ecology. Lake Chautauqua is an example. The process of degradation there took only twenty years. Weeds and green slime now obscure waters formerly transparent.

Ecologists and environmental engineers who have studied the implications of the recent population explosion of the Crystal Lake community have recognized the importance and urgency of three steps that must be taken to combat pollution and to preserve the quality of the lake. (1) Installation of a system of sewerage and sewage treatment around the lake; (2) Rigorous voluntary compliance at all dwellings and commercial establishments near the lake in a strong community effort to reduce the amount of aquatic nutrients - phosphorous and nitrogen compounds - entering the lake from septic tank effluents and seepage from over-fertilized lawns; and (3) regulation and other controls of Cold Creek to reduce the substantial pollution from this source at the eastern end of the lake.

Sewerage and sewage treatment are essential to long-term success in combatting lake pollution. Construction costs to property owners will be substantial even with a large federal subsidy. But these costs will be small in relation to the potential fall in property value if the battle to stop pollution is lost. Efforts to halt long-term degradation of the lake cannot succeed without capital investment in a sewerage system. Implementation of this project is of major importance not only to the ecological health of Crystal Lake but also to the economic health of Benzie County. However, it is essential that owners of property on or near the lake realize that while sewerage is necessary it is not sufficient.

Investigations of a team of scientists and engineers from the school of Public Health of the University of Michigan have shown that Crystal Lake is a nutrient trap. Nutrients (compounds of phosphorous. and nitrogen) that enter the lake remain active for many years, perhaps as long as fifty years before they are released or otherwise rendered inactive. The process is irreversible; after the biological balance is upset deterioration of water quality will continue. No practical techniques are known to recoup the loss and to restore the original biological regime. Startling estimates have been made by experts of the present rate of accumulation of phosphorous compounds from seepage from lawns and household waste water disposal systems of the community. Several tons of detergents and fertilizer are used each season by summer residents and under existing hydrological and topographic conditions a large part of the nutrient chemicals in these substances ultimately is leached into the lake. The current annual increment of phosphorous compounds by leaching is large in relation to the amount of active phosphorous that was in the lake before the resort era. The calculations indicate that if the present rate of pollution is allowed to continue, somewhere between 6 years and 20 years

remain before the effects of eutrophication – artificial aging – of the lake will become patently visible to all. If experience in other lakes is repeated the transition from the oligotrophic (low production) to eutrotrophic (high production) states may be abrupt. The first deleterious effects of increased biological growth are sometimes concealed for several years beneath the surface of the deep water.

Phosphorous compounds in household detergents and phosphorous and nitrogen compounds in fertilizers used for lawns and gardens are the main agents that speed the aging process and accelerate the development of algae, weeds and slimes in the lake. The septic-tank sewage disposal systems in common use are effective in preventing bacterial contamination, but are not effective in removing the seaquatic nutrients which enter the lake by ground-water seepage, or in some cases, by surface runoff during heavy rainstorms. In the past few years detergents without phosphates or with reduced phosphate content have been developed and are now widely available. Use of these new products in place of the older detergents rich in phosphate at all cottages and camps around the lake would be a very important forward step in halting lake pollution. Moreover the effect would be immediate and would contribute to preserving the beauty of Crystal Lake during the period of years required for construction of sewers and connecting links to the cottages.

Lawns are attractive and useful adjuncts to houses but under conditions prevailing on the periphery of the lake, lawn building and maintenance have not infrequently been a significant source of the phosphorous and nitrogen compounds that have entered the lake. With the sandy pervious soil characteristic of the region there has been a temptation to build and maintain lawns by heavy and repeated application of chemical fertilizers. When rain leaches the fertilizers into the sand layers below the root zones, growth can be maintained by additional dosage of fertilizer. The trouble is of course that the unused fertilizer is carried by the ground water into the lake particularly during the late fall season when the lake level tends to be low. It is possible to build and maintain a good lawn without excessive loss of fertilizer to the lake. This requires attention to developing the tilth of the soil by importing loam or by the admixture of peat moss or other organic additives that enhance the ability of the soil to retain moisture and plant nutrients. This coupled with adherence to the dosage recommendations of fertilizer manufacturers printed on the package would reduce lake pollution from this source and would constitute a significant step toward control.

Pollution entering the lake from Cold Creek in Beulah has for many years been an important factor in the gradual degradation of the quality of the lake water. Construction of the sewerage system in Beulah brought a marked improvement but did not completely solve the problem. The problem arises in fact from the decisions made about a hundred years ago to lower the lake level. This lowering exposed a considerable area of muck and peat at the eastern end of the lake now drained by Cold Creek. During 'periods of intense rain this material erodes and is swept into the lake and dispersed widely in the shoal waters of the Beulah shore to the detriment of the utility and appearance of the lake. A study is urgently needed of ways and means of controlling the quality of Cold Creek flow. This is the third and final step of the battle plan to halt pollution. Achievement of the goal will require an unusual degree of understanding and cooperation between the communities and the agencies of local government around the lake, but time will show that the benefits far outweigh the costs.

August 8, 1972
Harold A. Thomas, Jr.
Professor of Civil and Sanitary Engineering
Harvard University
1375 S. Shore Dr., Frankfort, Mich.