1. **INTRODUCTION**

The fisheries sector makes essential contributions to human development and food and nutrition security throughout the world, supplying vital nutrition to millions of people. Fish, as a source of "rich food for poor people", can play an important role in improving food security and nutritional status. Fish are an excellent source of high-quality protein and other nutrients vital to good health, including iron, calcium, potassium, vitamin A, and iodine. Especially for poor and food insecure populations, fish and fish products are often the only source of animal protein.

Fish contributes to food security in many regions of the world, providing a valuable supplement for diversified and nutritious diets. Fish is highly nutritious. It provides not only high-value protein, but also represents an important source of a wide range of essential micronutrients, minerals and fatty acids. Fish is a vital source of food for people. It is man's most important single source of high-quality protein, providing ~16% of the animal protein consumed by the world's population, according to the Food and Agriculture Organisation (FAO) of the United Nations (1997). It is a particularly important protein source in regions where livestock is relatively scarce fish supplies <10% of animal protein consumed in North America and Europe, but 17% in Africa, 26% in Asia and 22% in China (FAO, 2000). The FAO estimates that about one billion people world-wide rely on fish as their primary source of animal protein (FAO, 2000).
Fish makes a vital contribution to the survival and health of a significant portion of the world’s population. Fish proteins are of high biological value and occupy an important place in human nutrition. Proteins are important for growth and development of the body, maintenance and repairing of worn out tissues and for production of enzymes and hormones required for many body processes. The importance of fish in providing easily digested protein of high biological value is well documented. In the past this has served as a justification for promoting fisheries and aquaculture activities in several countries. On a fresh - weight basis, fish contains a good quantity of protein, about 18 - 20%, and contains all the eight essential amino acids including the sulphur containing lysine, methionine, and cysteine (Tont, 1977).

The fat content of fish varies depending on the species as well as the season but, in general, fish have less fat than red meats. The fat content ranges from 0.2% to 25%. However, fats from fatty fish species contain the polyunsaturated fatty acids (PUFAs) namely EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) (omega 3 fatty acids) which are essential for proper growth of children and prevent the cardiovascular diseases such as coronary heart disease. In pregnant women, the presence of PUFAs in their diets has been associated with proper brain development among unborn babies. In other studies, omega 3 fatty acids have also been associated with reduced risk of preterm delivery and low birth weight. The fat also contributes to energy supplies and assists in the proper absorption of fat soluble vitamins namely A, D, E, and K (Steffens,1989).
Fish is a rich source of vitamins, particularly vitamins A and D from fatty species, as well as thiamin, riboflavin and niacin (vitamins B₃, B₂ and B₃). Vitamin A from fish is more readily available to the body than from plant foods. Vitamin A is required for normal vision and for bone growth. Fatty fish contains more vitamin A than lean species. Studies have shown that mortality is reduced for children under five with a good vitamin A status. As sun drying destroys most of the available vitamin A better processing methods are required to preserve this vitamin. Vitamin D present in fish liver and oils is crucial for bone growth since it is essential for the absorption and metabolism of calcium. Thiamin, niacin and riboflavin are important for energy metabolism. If eaten fresh, fish also contains a little vitamin C which is important for proper healing of wounds, normal health of body tissues and aids in the absorption of iron in the human body. The minerals present in fish include iron, calcium, zinc, iodine (from marine fish), phosphorus, selenium and fluorine. It is evident that fish contribute more to people’s diets than just the high quality protein they are so well known for. Fish should therefore be an integral component of the diet, preventing malnutrition by making these macro- and micro-nutrients readily available to the body. Development and agricultural programmes including fisheries and aquaculture which mainstream nutrition issues can go a long way in alleviating the problem of malnutrition in this part of the world as well as in other countries.

Environmental protection has attracted the attention of the wide cross-section of people all over the world, which has now become a global issue amongst scientists and researchers working in this area. Unfortunately, several toxic
pollutants, few are even unknown or unidentified to the biota, are being regularly introduced in large quantities into the environment, especially into the aquatic environment. Pollution of water is an important dimension of environmental degradation. The disposal of the industrial and agricultural wastes directly into the aquatic medium burdens the ecosystem and stresses the need to analyze the concentration of these substances in the medium as well as in the organisms. Herbicidal pollution constitutes the most dangerous health hazard apart from creating adverse effects on fish production.

Herbicides have contributed by dramatic increase in crop yields and in the quantity and variety of the diet. Also, they have helped to limit the spread of certain diseases. But they have harmful effects since they can cause injury to human health as well as to the environment. The range of these adverse health effects includes acute and persistent injury to the nervous system, lung damage, injury to the reproductive organs, dysfunction of the immune and endocrine systems, birth defects, and cancer (Mansour, 2004).

Problems associated with herbicide hazards to man and the environment are not confined to the developing countries. Developed nations have already suffered these problems, and still facing some problems in certain locations. For many reasons, the severity of herbicide hazards is much pronounced in Third World Countries (Mansour, 2004).
Water pollution due to pesticides is a serious problem; due to their toxicity and persistence in the environment. More and more chemical formulations are widely used to control insect pests of agricultural crops due to lack of suitable substitutes (Westernhagen et al., 1987). As a result of their usage, they find their way into the freshwater resources with the run-off water from agricultural land, or by direct application, spray drift, aerial spraying and by discharge of effluents from factories and sewage (Daabees et al., 1992). Most environmental problems of concern today are attributed to the production and release of toxic chemicals capable of interacting with the environment and disrupting the ecosystem. Indiscriminate discharge of herbicides from agricultural runoff and other sources into aquatic media affects non target organisms such as fish and prawn which are of great economic importance to humans. In addition, sometimes herbicides are used to control fish diseases; at present, thiobencarb at very low doses is being widely used to control argulus disease and to eradicate the larvae of mosquitoes and milk fishes during pond preparation. Thiobencarb is being used extensively in rice fields to control weeds. Contamination of water bodies adjacent to rice fields by thiobencarb, mainly through run off, is quite possible. Thus, it can be toxic to aquatic organisms. Fish blood is being studied increasingly in toxicological research and environmental monitoring as a possible indicator of physiological and pathological changes in fishery management and disease investigations (Adhikari, 2004) as the blood in the gill has direct contact with the water medium and any unfavorable change in the water could be reflected in the circulatory system. These studies could be used to indicate the health status of fish.
Herbicides are one of the most potentially harmful chemicals liberated into the environment in an unplanned manner. Though they have contributed considerably to the welfare of humans, their adverse effects on non-target organisms are enormous. The major sources of environmental contamination by these chemicals are from agricultural practices, usage in public health programmes and industrial discharges (Hazarika and Dass, 1998).

In recent years, large quantities of pesticides have been produced and discharged into the environment. Herbicides, a distinctive group of pesticides, are considered as selective chemical weed killer; hence they have been intensively used to destroy the unwanted plants, especially in agricultural settings (Dutta and Meijer, 2003). The impact of chemical environmental contamination on fish health, consequently fish productivity is of economical relevance for fishes as well as aquaculture. Environmental pollutants have been reported to accumulate in fish and have threatened human health either directly or indirectly through the food chain. Accumulations of toxic compounds which may be carcinogenic or mutagenic were manifested as hazards (Porte and Albaiges, 1994, and Jacobs et al. 2002). However, the proper handling and use of herbicides in aquatic areas are especially critical, accidental spills or over dose can kill fish or cause other damage to its habitats that may lead to reduction in the fish population.