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The Environmental Impact of Fertilizers 423

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Fertilizers are indispensable for the production of food and natural fibers in the high technology – energy intensive agriculture of the developed countries. They are becoming increasingly important elsewhere where the options are frequently either hunger or importation of food or fertilizer. In the U.S. as much as one half of crop yield can be attributed to use of fertilizers, but the amount depends on the kind of crop, adequacy of water, and the native fertility of the soil. High yields permit minimization of the amount of land needed for cultivated crops thereby decreasing soil erosion and maintenance of more land with high erosion hazard in grass and forest. In the last decade fertilizer use has been questioned by environmentalists because of the possible contribution of the nitrogen and the phosphorus to nonpoint source eutrophication of surface water and nitrate accumulation in drinking water supplies. Unwanted nutrients in water have many identifiable point sources, but also have nonpoint sources that are difficult to measure. All kinds of land and land use contribute elements to water either from dead vegetation, eroded soil, or ions in solution. The extent to which *fertilizers increase nutrients in run off or percolating water* is still mostly unknown for comparatively large areas such as river basins, although some information on local effects of misuse or overuse of fertilizers is available. How these deleterious effects of fertilizers are offset by favorable effects on better use of land have not been adequately examined. Nitrogen moves in water mostly as nitrate. Phosphorous moves mainly attached to dislodged soil particles, so the needed management practices are quite different. Regulation of fertilizer use can be justified only on a local or small watershed basis after collection of the needed data on all sources of contamination and the alternative methods and costs of control evaluated. With high consumer costs for food and opportunities and demands for export of more wheat, soybeans and feed grains, mandatory reductions in total fertilizer use will not be popular. Shortages of and rising costs of fertilizers may serve to control overuse where it has occurred in spite of the conservative recommendations of experiment stations and extension services. Far more farmers use too little fertilizer than too much. We need more measurements of nutrients in percolating and run off water under conditions where the fertilizer contribution can clearly be delineated and related to the yield level. We need more information on the extent to which nitrogen-fixing legumes can be substituted for fertilizer nitrogen and still maintain production without plowing up too much land in permanent grass of cutting forests. We need more study on pollution hazard, production levels, and land use alternatives as affected by fertilizer options using systems analysis and computer *simulation on the data now available.*

Environmental Policy and Developments in Water Supply In West Germany and Europe 455

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The article outlines th[illegible]ic strategy of the West European countries in fighting pollution and describes in some detail the specific problems a[illegible]search results in West Germany. Basis for the national actions is the environmental policy as stated by the members [illegible]e European Common Market. Probably the most important economic points are that the Common Market empli[illegible] the "Polluter's pay principle" and an "Environmental impact analysis" for all of its actions. The Common M[illegible]et community has recognized that a balanced economic development without an improvement in the [illegible]lity o[illegible] environment and environmental protection is no longer conceivable. Water quality and quantity management [illegible]mportant in highly industrialized and densely populated Western Germany, since water demand is expected to [illegible] year 2000. *One of the instruments for raising funds for pollution abatement and for creating an incentive for* [illegible]eduction [illegible] a new Federal bill and wastewater charge (about 10 dollars per population equivalent). Parallel to the [illegible]ication of the "Polluter's pay principle" is an increased effort in research (biocides and detergents), new standards for heavy metals in wate[illegible] and stiffer fines for water law violations. Efforts on multinational levels focus on the Rhine River and Lake Constance [illegible]hich are both used for water supply in spite of heavy wasteloads. Interdisciplinary cooperation as practiced in the West [illegible]erman Water Boards is considered a basis for regional water supply and sewage removal.

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PCB's a[illegible] Their Environmental Effects 469

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The levels of PCB's in air, water, and in various tropic levels are tabulated for many parts of the world. These values are used to estimate the amount of PCB's in the biosphere and are related to the production of PCB's and their routes of entry into the environment. *The relative importance of the various modes of transport are calculated. The findings are compared* to those previously deduced for DDT. The direct toxicity of PCB's are known to be low and this aspect will not be considered in detail. Chronic, sublethal effects will be considered in detail and related to current and projected environmental levels.

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