OH, THE FARMER AND THE ENVIRONMENTALIST

SHOULD BE FRIENDS

by Roger L. Caldwell*

"If we could first know where we are and whither we are tending, we could better judge what to do and how to do it."
— Abraham Lincoln

Beginning in the late 1960's and early 1970's, there occurred in this country and worldwide a re-awakening of a concern for the environment. Hundreds of years ago, when man was living and hunting in natural surroundings, the environment was much different from today's. Then, man did not have much capacity to pollute, the interactions between communities of men were minimal, and there were seemingly unlimited lands and resources available.

Today, the actions of one group may affect many other groups. There is more pollution, and more people

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are affected by it. There are few places to move to when land is worn out or mineral deposits depleted. There is a long-term shortage of water, energy, prime land, and certain minerals. There is insufficient information to evaluate all the consequences of many of our actions. Today there is little control over resources which many people must use. Examples are air and water quality, ocean fishing, and public lands. When many people must use a resource and no one has the responsibility for managing or maintaining it, many are apt to be adversely affected.

Until recently, environmental legislation generally aimed at controlling pollution and had specific impacts (such as control of air pollution from selected sources, or control of certain water pollutants). In the late 1960's, new kinds of environmental laws were passed, which recognized the complex interacting nature of environmental issues.

Perhaps the most significant was the National Environmental Policy Act of 1969 (NEPA). This Act created the federal Council on Environmental Quality and required that reports be made on the impact federal projects would have on the environment. Soon after came the Resource Recovery Act of 1970, the Clean Air Amendments of 1970, the Occupational Safety and Health Act of 1970, the Federal Environmental Pesticide Control Act of 1972, the Federal Water Pollution Control Act Amendments of 1972, the Noise Control Act of 1972, the Surface Mining and Reclamation Act of 1974, the Safe Drinking Water Act of 1974, the Energy Supply and Environmental Coordination Act of 1974, and the Energy Policy and Conservation Act of 1975.

Environmental Issues

While much of the force initially behind the "environmental movement" came from ecology groups, wilderness associations, and beautification committees, the movement has come to embrace many more and different groups and issues. The depth and type of public concern for the environment have been tapped by a number of surveys. Typical of these was a Spring 1974 survey of 1,550 people (57 percent return) by a College of Agriculture committee. Table 1 indicates

Table 1

ISSUES OF GREATEST CONCERN

Agricultural Groups	Environmentalists	Overall Population
1. Energy	1. Environmental quality	1. Energy
2. Economy	2. Government integrity	2. Economy
3. Government integrity	3. Energy	3. Government integrity
4. Public order	4. Public order	4. Public order
5. Land use	5. Education	5. Education
6. Environmental quality	6. Transportation	6. Land use

CONFLICTING USES: Farmland is being lost to pavem

the results of a question asking for a ranking of the greatest concerns among 11 possible categories. While obvious differences exist, both agricultural and environmental groups consider environmental quality as one of the more important concerns. This is even more obvious if you include other environmental factors such as energy and land use.

When asked to rank the greatest environmental concerns from 17 possible categories, the groups again showed similarities (Table 2).

As indicated earlier, the first definitions of "environmental quality" were generally restricted, and included basic ecology, wildlife, and beautification. This resulted in some reaction against many of the early-day "environmentalists" and still causes statements such as "Do you want clean air or food on the table?" In the last five years, the term "environment" has been broadened to include new concepts and stresses the interaction among all of them. For example, a current definition of environment might

Table 2

ENVIRONMENTAL ISSUES OF GREATEST CONCERN

Agricultural Groups	Environmentalists	Overall Population
1. Land use planning	1. Land use planning	1. Land use planning
2. Energy	2. Air pollution control	2. Energy
3. Population growth	3. Population growth	3. Air pollution control
4. Water utilization	4. Energy	4. Population growth
5. Waste management	5. Protection of plants/animals	5. Water utilization
6. Air pollution control	6. Preservation of special areas	6. Water pollution control

ile the world is demanding increased production of food.

be "the system of interrelationships among society, economics, politics, and nature in the use and management of resources."

Only recently has there developed a widespread appreciation that there cannot be infinite growth in a finite world. We are realizing that there are limits to resources, and that shortages of energy, minerals, and food will continue. There are frequent references to the maximum population the earth can sustain in the long term (the "carrying capacity"). There are new measurements of progress developing, which evaluate all environmental factors, not just the economy.

In the past we generally measured "progress" exclusively in terms of increases in the Gross National Product. This was appropriate when natural resources were thought to be unlimited, or where the actions of one did not infringe upon the rights of others. Now the concept of "quality of life" is widely considered a better measurement of progress. From easily available statistics, a quality of life index can be developed. It might, for example, consist of personal safety, health, education, home and community environment, economic satisfaction, available recreation, and ease of access to shopping, entertainment, jobs.

Thus, the environmental issues are threaded throughout society. As society has become more complex, and we have realized some of the harmful — but delayed — effects of our past activities, we have begun to address these new issues (1).

Agricultural Issues

Agriculture has long been concerned with the environment. It was agriculture which pioneered the adoption of contour plowing, reservoir development, land and resource management, as well as establishing such agencies as the Soil Conservation Service and the U.S. Forest Service. The Cooperative Extension Service of the U.S. Department of Agriculture has an environmental thrust, and youth programs through 4-H are heavily involved in environmental activities.

It has been said that agriculturists were the first conservationists. However, some environmental problems have accompanied the boom in agricultural production over the years. Animals and plants that were not meant to be the targets of certain pesticides and herbicides have been killed. Streams have been polluted by fertilizer runoff, and the air has been fouled by crop burning. Odors, noise, and pollution have arisen from food processing plants.

We have observed tremendous increases in crop yield in the last 50 years, due primarily to improved varieties, fertilization, irrigation, and pest control; but these increases are coming more slowly and, in some cases, are declining. The oceans were once thought to be significant sources of food production (Figure 1), but the world's harvest of fish has been levelling off.

Agriculture, along with other segments of society, has substituted capital (energy) for labor, with a resulting increase in energy demand. For example, energy use for fertilizer production, equipment manufacture, fuel, and transportation has dramatically heightened production efficiencies, but these positive effects of energy use are approaching a leveling-off (Figure 2).

Agricultural land has frequently been buried under the "higher use" of residential and shopping

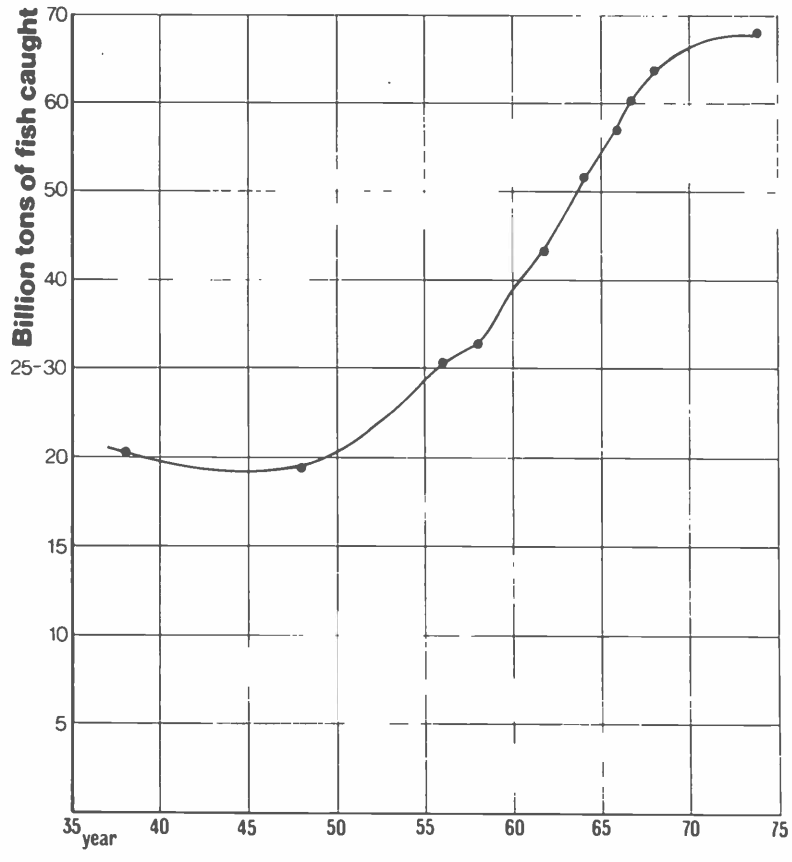


Figure 1. World Fish Catch

SALT CEDAR: Beautiful (above) nesting for birds, and a clogger of Arizona streams (right), the plant has caused bitter dispute between farmers and environmentalists.

center subdivision. This was a common and perhaps desirable pattern when agricultural land was plentiful and there were restraints on production. But now we are entering an era of shortages rather than surpluses, and new rules are required. Some states have decided that prime farm lands shall be permanently zoned as agricultural. Many states, such as California, have adopted land use plans which provide some tax incentive for retaining prime lands in agriculture. From 1950 to 1970, urban areas swallowed 13.5 million acres of rural land (1 percent of all crop land). Until 1972, crop land in the United States was in economic surplus, so urbanization had a minimal impact on productivity (Table 3). By 1974, however, farm policy and world demand had changed and required full production by U.S. agriculture. At the same time as the need for increased international cooperation has become evident, U.S. food exports have become a major factor in a favorable balance of trade program and food and energy have received a new and important world-wide status.

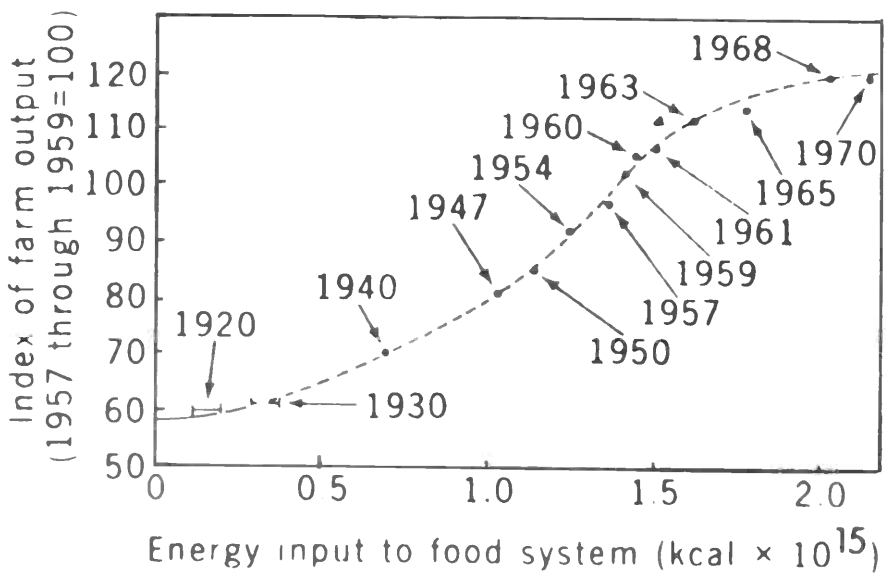
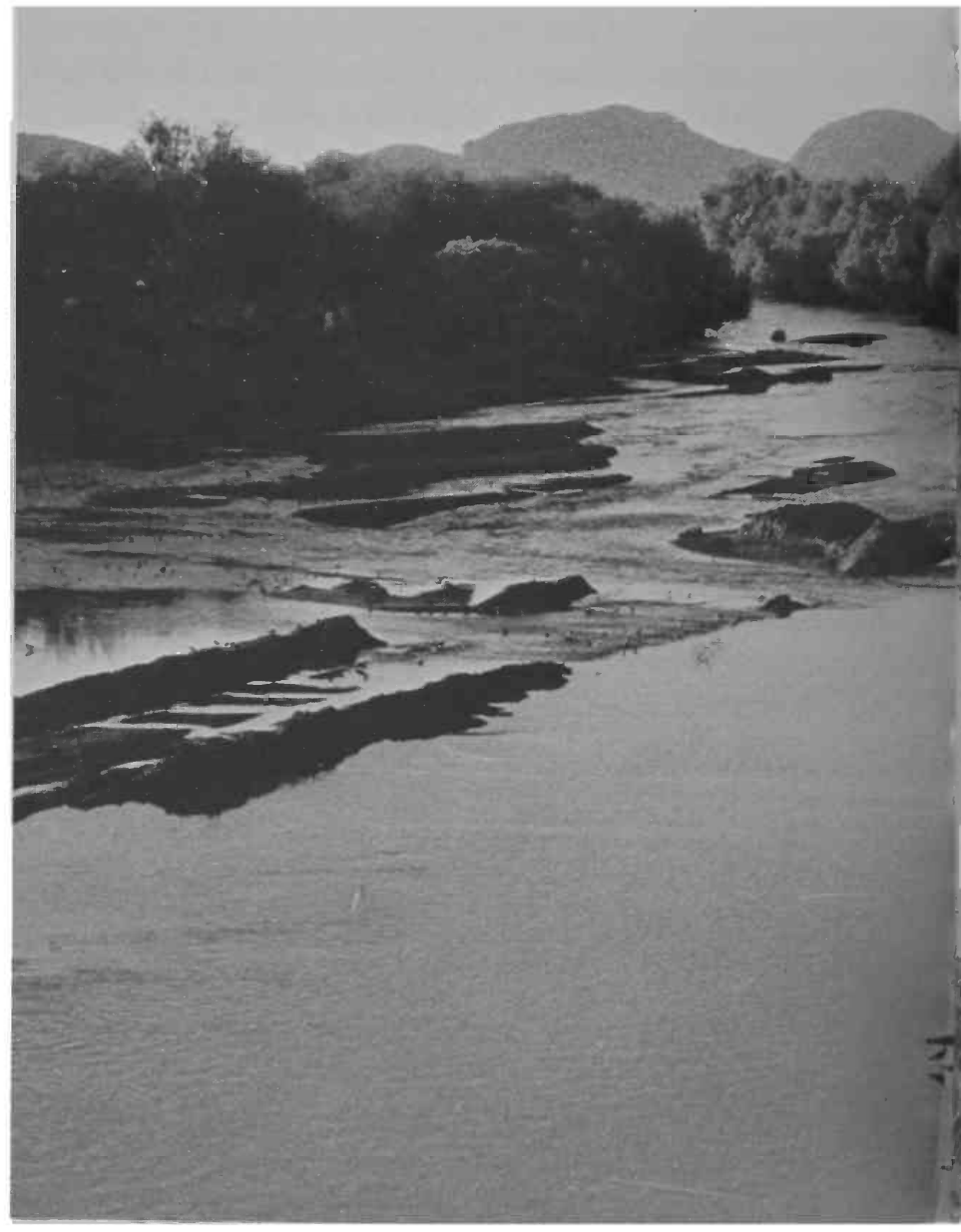


Figure 2. Farm output as a function of energy input to the U.S. food system 1920 through 1970.

Table 3

LAND USE CHARACTERISTICS

Land Type	U.S. (50 States)	Arizona
Federal	33.7%	43.5%
State	5.9%	12.2%
Indian	2.5%	26.7%
Private	58.2%	17.6%
Crop	21%	2.1%
Pasture	26.6%	0.0%



Just when increases in crop yields and fish production are leveling off and when a burgeoning world population is demanding that we produce more food, there are signs of a reduction of available agricultural lands and the possibility of an unfavorable weather trend developing. This is accompanied by environmental laws that put constraints on agricultural production in order that certain standards are met (most notably safety, pesticide use, and water quality).

These constraints are causing some friction because people tend to want to continue under past conditions, particularly when change is forced by legislation. But many of these regulatory restraints have evolved from yesterday's lack of proper attention to potential problems. Only when we discuss agricultural production in terms of years, not one season, do many of the goals of environmentalists and agriculturists seem common (2).

Interactions, Trade-offs, and Risks

Agriculture is finding itself interacting more frequently with seemingly non-agricultural concerns. In Arizona, the majority of the crop land is interspersed with urban areas. There are second-home subdivision developments in rural Arizona, and there is a greater growth rate in certain of the rural counties than in the large, metropolitan counties of Maricopa and Pima.

The demands for water by mining, agriculture, energy production, industrial and municipal use must be considered in relation to supplies. Transportation costs for agricultural products must be balanced against the advantages of localized production. When planting large acreages to single varieties of a particular crop (a common practice), the increased risk of pest infestations and climatic variation must be taken into account.

There is now a significant segment of the population that has not been "raised on the farm," and their understanding of food and fiber production is limited. Important roles for agriculture in urban areas include providing for "demonstration farms" for urban dwellers, open space in urban areas where land has been devoted to agricultural use, and an emphasis on the compatibility of strong agricultural production along with the public's deepening concerns for environmental quality. There are compromises involving trade-offs in every decision. Today society is complex, and complex mechanisms are much more apt than simple ones to go awry and to create greater hazards when they do. Major decisions cannot be carried out if they are made by one segment of society without consultation with other segments (or without strong public support).

Information as Central Problem

Top priority has to be assigned to the gathering and broadcasting of accurate information about the environmental problems that do exist. Time after time, studies show that when groups of people attempt to decide what is the most important environmental issue they find themselves frustrated by not having the information needed to evaluate the problem or to make decisions regarding it. Indeed, all other concerns could be considered to be symptoms of not having at hand the needed information.

Adding to the problem is that many persons and groups, that are sources of information about a problem, take sides on the issues. The experts and publications of many organizations present only the data that support their case. This, in the eyes of the public, gives credence to Mark Twain's declaration that there are "liars, damned liars, and statisticans." Such issues, for which there are no simple solutions, then become polarized for the public as well. This can be illustrated by one of the most significant agriculture-environment clashes — the one over DDT.

There are those who proclaim DDT one of the greatest benefits to mankind (3). There are others who conclude that it is one of the worst discoveries of the last 100 years (4).

Because so much has been written and so many studies have been completed about DDT, there are hundreds of references available. Depending on one's own feelings, and the interests of the audience the book or article is written for, a sufficient number of

documented cases can be obtained to prove the insecticide holy or evil. This is not only misleading reporting, but it also polarizes and intensifies, rather than resolves, an already confusing situation. It does, however, serve the purpose of those on either side with an axe to grind.

An accurate history of DDT regulatory activity, based on available evidence, has been recently summarized and published by the Environmental Protection Agency at the request of the House of Representatives' Appropriations Committee (5).

DDT was first synthesized in 1874, but not until 1939 were its insecticidal properties first observed. During World War II, the chemical was used for the effective control of such diseases as typhus and malaria. In 1945, commercial and agricultural use of DDT was permitted. By then, many persons had observed firsthand its obvious effectiveness and its apparent safety. After peak production in 1959, manufacture of DDT dropped sharply. This decline in use was due to: (1) increased insect resistance (the house fly was first observed to have achieved resistance in 1950); (2) the development of more effective alternative pesticides; (3) the growing public concern over adverse environmental side effects; and (4) increasing governmental restrictions on DDT use.

Many DDT proponents blame the publication of *Silent Spring* in 1962 for the decline of DDT. While this did stimulate widespread public concern, the book cannot take credit for the original decline between 1959 and 1962. In 1957 the U.S. Forest Service prohibited certain DDT usage on lands under its jurisdiction. In 1964 and again in 1970, the Department of Interior restricted DDT and other chlorinated hydrocarbon pesticides on its lands. Between 1967 and 1970 the U.S. Department of Agriculture cancelled permission (registration) to use DDT on a number of crops and ornamentals.

In 1970, the Environmental Protection Agency (EPA) was formed, and under a court order in 1971 issued notices of intent to cancel the remaining DDT registrations. In 1972 the EPA cancelled all crop uses (but not public health uses) in the United States: this decision was upheld by the courts in 1973. In addition, 26 states have placed either a partial or complete restriction on DDT (Arizona issued a complete ban in 1969), and four national technical committees (1963, 1965, 1969, 1969) evaluated DDT evidence and recommended an orderly phasing out of DDT over a limited time period.

Thus, in the minds of special interest groups (for example, pesticide producers or wildlife protectionists) and many members of the public, there remains a great deal of controversy over DDT. If the vast amount of evidence from various groups were readily available and believable, the issue of DDT use could be resolved. The current DDT controversy is being kept alive by those who selectively use seemingly contradictory evidence on the insecticide. Clearly, DDT use would inevitably have declined as more evidence on its environmental effects and development of pest resistance accumulated. But it is an important insecticide and its use could have been limited short of a total ban. It is important to develop a mechanism for resolving controversies such as this, in order to deal with similar cases in the future.

Changing Times

We are in a transition period and it is always difficult to change one's ways, if sufficient incentives to do so do not appear to exist. Nearly everyone is comfortable in an established pattern; therefore the change must seem particularly advantageous, and it must not conflict directly with long-held traditions, prejudices, and value judgments. When evaluating well-established views and trends, it is often difficult to know whom to believe (for example, what is the real story on Arizona's water supply, or the world energy supply?). People become confused when technically trained persons mix fact with their opinions in reporting on a topic.

More and different kinds of people are now asking if we can continue to act on the premise of unlimited growth. And more and more leaders feel we are going through a transition stage after which our traditionally growth-oriented society will become a steady-state society (Figure 3).

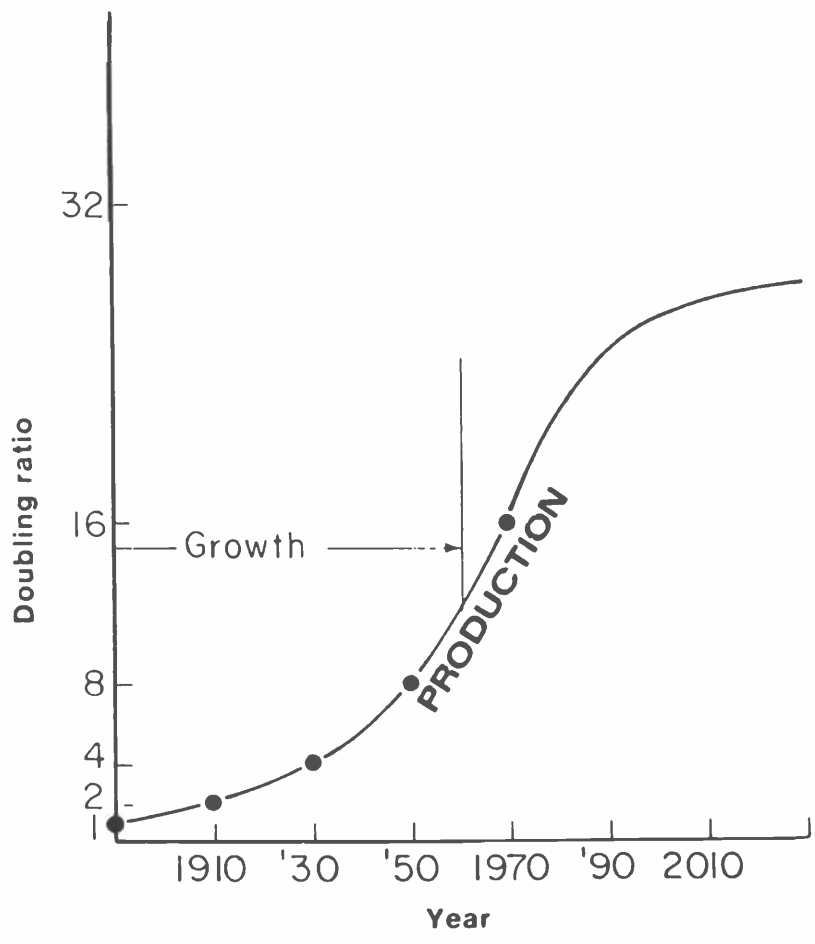
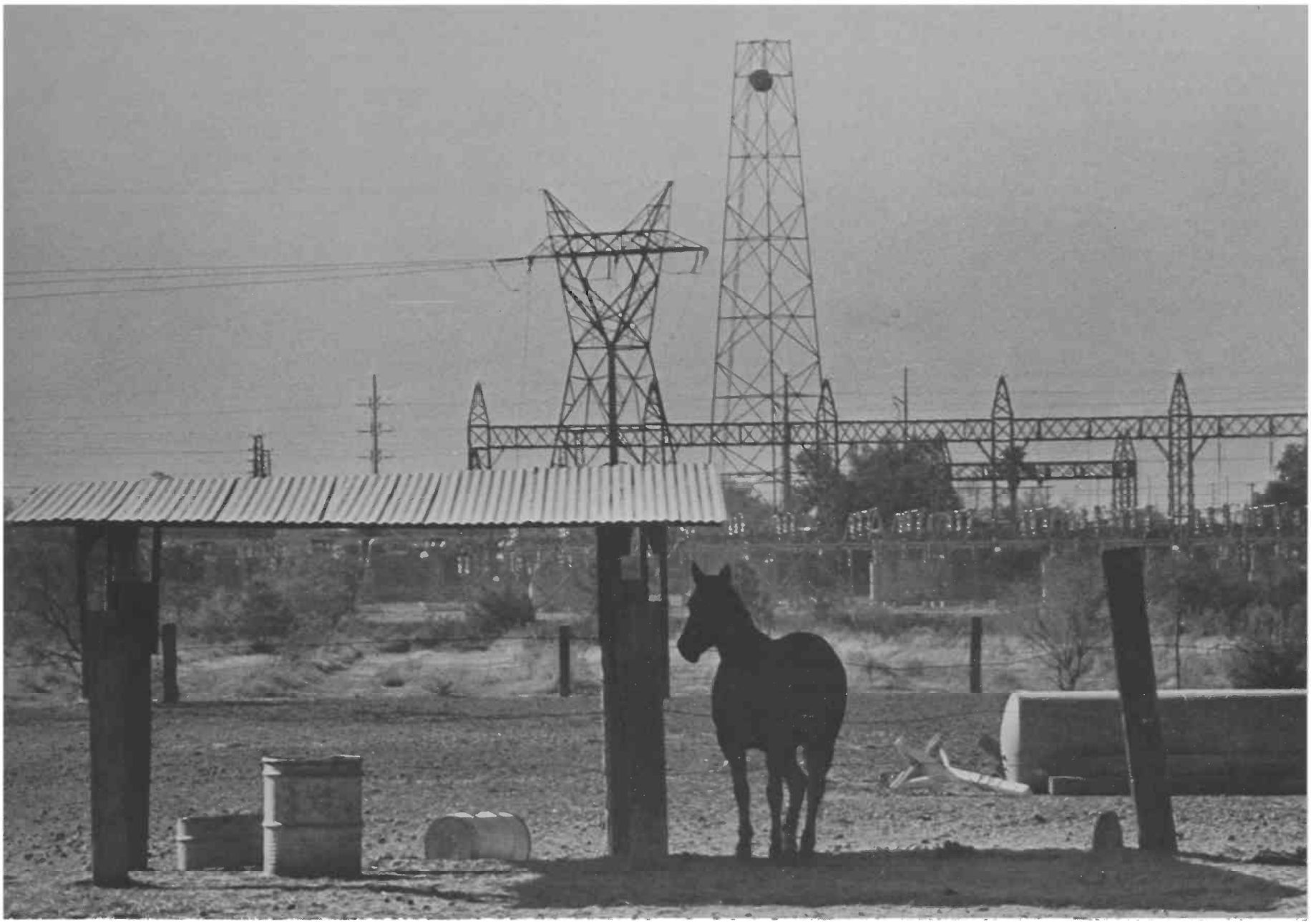


Figure 3.



OPEN SPACE: It can be preserved, but zoning measures and tax relief are needed.

Some of the major factors in this transition include population, food, natural resources and energy, capital availability, and social disruption. There is a requirement for more openness and greater public participation in the decision-making process. The evaluation in recent years of alternative solutions and consideration of their social, environmental, and economic impacts have all served to change significantly the way things are being done. It has become clear that we cannot base our long-range planning on what has happened in the past, an all-too-common practice. "Forecasting" is necessary where the many changing factors and alternative solutions are considered.

This will be complicated by a need for more information than is actually available. We will have to learn to use "best probable estimates" in place of very specific information. We may begin to base decisions on future needs rather than historical occurrence.

As we learn more of environmental variables, more regulatory restraints will be applied to society. For example, only recently have the toxic or cancer-inducing properties of asbestos, polyvinyl chloride, selected drugs, some food additives, of certain pesticides, nutritional deficiencies, or naturally occurring toxins become widely known. Exposure may take 20 to 30 years to produce symptoms. When undesirable environmental impacts are continued without correction, then regulation becomes necessary. Such delay not only increases the costs of correction but also leads to incomplete solutions and bad will among those affected.

There are certain conflicts in Arizona between environmentalists and agriculturists. These include debate over the Central Arizona Project, phreatophyte and brush control along waterways, technical solutions to water and salt content versus purchasing the farm land, predator control, and public access to leased public lands. The agriculturists and the environmentalists, however, have many goals in common including preserving prime agricultural lands, creating open space, the obligation of agriculture for energy production, new food sources, air pollution control by vegetative absorption, and soil conservation.

Once both agricultural representatives and en-

vironmental groups understand the other's viewpoint and reasons for behavior, an improved dialogue can be developed. As we learn more about the agricultural production system and the environmental conditions under which we live, there will be an increasing proportion of both groups committed to the long-term maintenance of the system.

Summary

It seems clear that we are entering a new era. There have been times when agriculturists and environmentalists have found themselves at odds; this is to be expected, as each group views an objective from a different perspective. There have also been instances when the two groups were closely aligned in viewpoint. Examples would include preservation of agricultural land, control of population growth, air pollution control, and soil conservation. Additional common goals are the use of soil and plants to absorb air pollutants, use of land for solid waste disposal (combined with crop production), use of animal waste as a feed source for micro-organisms or other animals, and use of agricultural products (biomass) as a source of energy.

As population and development pressures continue to increase, and as water and energy become reduced in supply, there will be large impacts on agriculture. Some of these impacts will appear to be favorable — and others will appear to be unfavorable — to agriculture. Since many of these impacts will be new, it will be difficult to make the necessary changes in society to resolve them. In many cases, the technology will be simple to develop compared to the problems of educating people and restructuring organizations so they most easily respond to the changes.

To address topics of environment and agriculture and to attempt to resolve some of the differences and emphasize common goals, the College of Agriculture established a Council for Environmental Studies in 1974. The Council has two major functions: (1) to provide communication on environmental subjects between College of Agriculture groups and others, and (2) to provide advice and coordination within the College of Agriculture on the variety of agricultural and environmental programs in teaching, research, and public service.

Selected References

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(5) U.S. Environmental Protection Agency. 1975. *DDT: A Review of Scientific and Economic Aspects of the Decision to Ban its Use as a Pesticide.* Washington, D.C. 300 pages.