

## AGRICULTURE AND THE ENVIRONMENT – BUILDING A SUSTAINABLE AND HEALTHY FUTURE

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It is a pleasure for me to welcome the participants to this conference, and to have the opportunity to make a few remarks that might serve as an introduction to the important topics that will be discussed today. More than 200 years ago, Malthus confidently predicted a logarithmic increase in the world's population and postulated that food production could at best only increase in a linear fashion. He suggested that the resulting deficit in production of food for the burgeoning population would result in widespread famine, disease, and war. Malthus was right, the world population has continued to increase, frighteningly, in an exponential fashion. But he was wrong about the rate of increase in agricultural productivity, which has more than kept pace with the demands of the world's population. Despite the sad statistics of wide-spread malnutrition and local areas of famine, total world food production per capita is now greater than it was two centuries ago.

Although Malthus recognized the opportunities for continued increase in food production on America's vast prairies west of the Missouri, he could not have foreseen the technologies that would make food production truly a global enterprise. He had no idea that Britons would eat bread made from the wheat grown on the vast plains of western Australia and Canada, or that the new textile factories of Manchester would be spinning wool produced in Australia and cotton grown in India. Nor could he foresee the refrigeration technologies that would allow British households to dine on New Zealand lamb, and spread their Australian bread with New Zealand butter and cheese.

And certainly he could not have expected the dramatic effects that synthetic chemicals would have on agriculture. The synthesis of ammonia gave the ability to apply more nitrogen than what could be garnered from animal wastes. Insecticides provided tools to prevent the depredation of insects, and fungicides averted the widespread crop failures that had previously been caused by plant disease. The importance of these chemicals to food security was highlighted by the events of the Irish potato famine, where a single fungus caused widespread famine, death, and

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wholesale relocation of populations. When Malthus wrote, the basic principles of genetics were still undiscovered, principles that would increase the productivity of all crops and animals. Last century, breeding alone increased the per acre productivity of some grain legumes an astonishing 900%.

The productivity and efficiency of modern agriculture is epitomized by agriculture here in California. Our favorable and diverse climate, availability of high quality water, and readily accessible expanses of fertile soils favor the production of more than 350 different crops and animal species, generating a farm-gate value estimated at \$27 billion last year. Our 83,000 farms cover 30% of the State's land area, and include 8.5 million acres of irrigated agriculture. As economists calculate these things, California's agricultural industry and its spin-offs generate a total economic activity in excess of \$65 billion, representing 9% of the Gross State Product, and providing 10% of the employment in California. Agriculture's impact is not just within California – the state is truly the fruit-bowl of the nation, providing more than half of the nation's fruits, vegetables, and ornamentals. For some crops, such as almonds, walnuts, and pistachios, California is the major world producer, and exports of horticultural products generate substantial overseas exchange income for the State.

But all is not well with this Paradise, and that is the reason today's meeting is so timely and appropriate. The success of agriculture in matching or outpacing the increasing world population has had significant impacts on the environment. Not only has the era of chemical agriculture resulted in unacceptable contamination of land, air and water, but also many chemicals and pesticides have had the unforeseen and unintended consequences for the health of humans, animals and birds that were so tellingly cataloged by Rachel Carson in 'The Silent Spring'. In addition, agriculture has placed great demands on what we now recognize as our limited natural resources. In manipulating the land to improve productivity farmers have obliterated important ecosystems – California's ancient vernal pools are only one example. Agriculture's thirst for water has resulted in the harnessing of many of California's rivers into the monumental water projects that lace California with reservoirs, aqueducts, and irrigation canals, but has also left too little of that precious resource for important fisheries and the ecosystems on which they depend.

For most of the 20<sup>th</sup> century, therefore, agriculture and the environment were seen to be pitted against each other – farmers against environmentalists, a dichotomy that was piquantly expressed by a writer in last Friday's Sacramento Bee (Bowman, Sacramento Bee, Mar. 1, 2002), who opened an article entitled 'Pollution crackdown ahead for state farms'

with. . . ‘Agriculture’s long free ride as a pervasive polluter of California’s rivers and streams is coming to an end’.

As we consider public policy and legislative approaches to the topic of today’s conference – *Agriculture and environment: Building a sustainable and healthy future* – I would urge that we work to consign the agriculture:environment dichotomy to history, and seek a different viewpoint, developing public policy that favors positioning farmers as environmental stewards. We all recognize the important public goods that sustainable farming brings to our society. In addition to the Malthusian requirement for efficient production of food, fiber, and flowers, farming is a deep part of our culture. Farms provide open space and recreational opportunities, our rangelands are important watersheds for the State, and on the urban edge, farms provide aesthetic value that is highly appreciated. I had the opportunity to drive down Highway 5 last week in the early morning. The contrast of the velvet green of the coast range with the drifts of pink blossom in the early morning light at the height of the almond bloom reinforced the social and aesthetic value of these wonderful managed landscapes.

Unfortunately, the family farm in California, as in the rest of the nation, is no longer a profitable enterprise. In contrast to the dire predictions of Malthus, the production of food has outstripped the demand by the growing world population, so that prices for food and fiber today, in real dollar terms, are at an historic low. Most of the nation’s farms are supported by off-farm income - our farmers farm because they appreciate the rural life-style, because of their roots in the land, but not because they are making a handsome profit. The low profitability of the family farm has resulted in consolidation of family farms into giant corporate enterprises, conglomerates that may not value the public goods that we expect from family farms. Corporate farms sprawling over hundreds of square miles of California’s Central Valley are often monocultures that are close to ecological deserts.

Contrast those monocultures with the opportunities that an economically and environmentally sustainable farming enterprise can offer. The farms of my vision will have, at worst, a neutral footprint on the environment. Already the nation’s Agricultural Experiment Station Scientists are addressing that goal. A recent document (A Science Roadmap for Agriculture – NASULGC/ECOP, 2002) commented

*“We can provide the information and knowledge needed to further improve environmental stewardship. This can be done through new agricultural practices while continuing to enhance the quantity and quality of food and fiber production through genetics. Our nation’s dependence on natural resources and a clean environment mandates attention to preserving soil, air, and water quality. Moreover, the values placed by society on*

*open spaces and ecosystem services – including the conservation of biodiversity – need to be assured. We need to move as a nation toward new policies and programs that protect and preserve both the natural resource base and the environment. Our areas of scientific focus should be on:*

- *Developing better methods to protect the environment both on and beyond the farm from any negative impacts of agriculture through optimum use of cropping systems including agroforestry, phytoremediation, and site-specific management;*
- *Decreasing our dependence on chemicals with harmful effects to people and then environment by optimizing their use in effective crop, weed, pest, and pathogen management strategies;*
- *Finding alternative uses for the wastes generated by agriculture; and,*
- *Developing better economic models and incentives to assure that environmental stewardship is encouraged.*

But the farmers of the future may do more than the neutral ‘no harm’ proposed in this research plan. They should be positioned as the guardians of our natural resources, husbanding and restoring the State’s soils, providing tools for reducing the impact of urban populations on the environment by using and detoxifying urban waste, developing the techniques and providing the plant materials for restoration of degraded urban and rural environments, providing havens for biodiversity through companion plantings, and planting hedgerows of native plants that provide food and shelter for wild creatures. The story of the waterfowl/rice farmer partnership is a good example of what agriculture can do in the future to continue the production of the food that is needed by our growing population, but also provide significant environmental benefits. Faced with a mandate to reduce air pollution caused by burning of rice straw, and recognizing the excellent wildfowl habitat that can be created by flooding rice fields in the fall, farmers and waterfowl enthusiasts collaborated in funding research that has led to widespread adoption of this practice.

As we listen to the distinguished panelists and speakers today addressing the issues of water distribution, environmental justice, and water quality with respect to agriculture, I urge that we also think about how to craft public policy and legislation that creates an environment where family farms can be economically sustainable units devoted to the production of safe and nutritious products in an environmentally positive fashion.