

**ANR Design Teams, 2005  
Membership Lists**

<b>Design Team</b>	<b>Program Leader</b>	<b>Last Name</b>	<b>First Name</b>	<b>Title</b>	<b>Region</b>	<b>County/Department/ Statewide Program</b>
<b>Sustainability and Viability of California Agriculture</b>	Maxwell Norton	Canevari	Mick	County Director	CVR	San Joaquin
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		Mauk	Peggy	County Director	CCSR	Riverside
		Roose	Mikeal	Professor	UCR-CNAS	Botany/Plt Science
		Van Eenennaam	Alison	Specialist	UCD-CAES	Animal Science
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		Thompson	Lisa	Specialist	UCD-CAES	Wildlife, Fish and Conserv Biology
		Atwill	Rob	Specialist	UCD-SVM	Population Health & Reproduction
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		Neale Olin	David Paul	Professor Director	UCD-CAES SP	Plant Sciences Sea Grant
		Rizzo	David	Professor	UCD-CAES	Plant Pathology
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**Environmental Quality Design Team  
Background Statement  
October 2005**

Natural Resources and Environment - Trends and Predictions

California's natural resources and environment are severely stressed by historic and current human activities, and the increasing demands brought about by the state's growing population. Land use, and associated water use drive human impacts on natural resources, and in the next 20 years these uses will interact with emerging factors such as climate change, invasive species, and habitat fragmentation. ANR is uniquely positioned to assist Californians in meeting the challenges they face in conserving and restoring natural resources and the environment.

Water Quantity and Quality Issues

Water is by far the most limiting natural resource in the semiarid Californian climate. Essentially, all of the available sources have been claimed and tapped. Demands nevertheless continue to rise. The current annual water demand of 79.5 million acre-feet is divided among three broad categories, namely environmental uses, 46%, agricultural uses, 42%, and urban uses, 12%. The draft California Water Plan, 2005 Update (<http://www.waterplan.water.ca.gov/>) projects that urban water demands will expand 40% by 2030 to accommodate the expected population increases. Additional water is also needed to fulfill the environmental mandates. There may be multifaceted approaches to meet the water supply challenges associated with population growth. Except for water from desalination, the water supply pool in the State is not expected to grow significantly. The agriculture sector is drawing a significant share of the State's limited water supply, and as water demands shifts with demographic trends, the agricultural sector will be forced to respond.

According to the 2002 National Water Quality Inventory (the most recent data), the water quality of over 90% of the rivers and streams, lakes and reservoirs, bays and estuaries, and wetlands in California is impaired and the waterways are not supporting the designated beneficial uses ([http://oaspub.epa.gov/waters/w305b\\_report\\_v2.state?p\\_state=CA#total\\_assessed\\_waters](http://oaspub.epa.gov/waters/w305b_report_v2.state?p_state=CA#total_assessed_waters)). Non-point sources are by far the most significant origins of pollution and sediments, while nutrients, salinity, pesticides, trace elements, and pathogens are the most common pollutants. In addition, the quality of California's groundwater is also threatened by elevated concentrations of nitrate, pesticides, salts, and perchlorate. Through conjunctive uses, the waters of watersheds and aquifers across the State have increasingly become interconnected. To significantly improve water quality, non-point pollution sources throughout the State must be brought under control. The degradation of water quality is taking water out of the supply pools. In severely water-limited California, water pollution equals water lost. Pressures are on for the agricultural sector to conserve water and preserve its quality.

Agricultural production has been a major cause of the non-point source water quality degradation in the State and contributes the largest amounts of pollutants. Through the agricultural discharge waiver programs, the regulatory agencies are requiring producers to monitor the quality of water released from fields and processing facilities. Subsequently, responsibility for non-point source pollutant discharge will be assigned through the total maximum daily load (TMDL) process. To improve water quality, producers will eventually be required to meet much stricter regulatory standards. As a publicly supported research and education institution the University of California has the responsibility to increase research and extension activities to assist Californian producers to comply with the anticipated regulatory standards.

Soil and Air Quality Issues

The soil is the foundation of terrestrial eco-systems. It modulates the flows of water, nutrients, and pollutants, supports the growth of plants and animals, and harbors microorganisms responsible for the biochemical cycling of essential nutrients. Lands (i.e., forestry, range, wild, agriculture, and urban) with properly managed soils will maintain an ecologically balanced flow of water and nutrients, support healthy habitats for human beings and other biota, be productive,

and generate minimal adverse impacts to water quality.

Blessed by the abundance of warm climate and water and highly developed production technologies (results of UC research, development and delivery efforts), California is the most diverse and productive region in the world. Current practices emphasize market timing and maximal profits. As a result, there are tendencies to overuse fertilizers, pesticides, water, and other soil additives (?). The practices that made California growers successful are implicated in soil and water quality degradations, and growers are already under ever increasing pressure to reform.

Intensive cultivation over time has also threatened soil quality, resulting in low fertility, erosive soil loss, and poor soil structure and tillage. More man-made inputs are required to maintain production, yet this cycle of soil quality deterioration and increased inputs is not environmentally sustainable. Soil pollution is an important source of air and water pollutants, downwind and downstream. The linkages of improper soil management and water quality are well recognized. Fugitive dusts generated during tillage operations and harvesting and from vacant fields are sources of airborne PM<sub>2.5</sub> particulates [define]. Re-deposited airborne particulates often carry nutrients, soil borne pathogens, and exotic invasive weed species from cultivated fields to adjacent fields, and beyond to urban and wilderness areas. In addition to the millions of irrigated cropland acreages, California is also a major location for confined-animal feeding operations (CAFOs). Poultry ranches totaling 50 million egg layers are scattering across Riverside, San Bernardino, Ventura and Petaluma Counties. Eight counties in the San Joaquin Valley have more than 1000 dairy herds housing 78% of the State's 1.5 million milking cows plus the replacement animals. Animal wastes in CAFOs deposited on the ground or flushed into ponds are exposed to the elements until they are disposed of. Ammonia, VOC [define], and particulates released from the stockpiled wastes are major contributors of the air quality deterioration-s in the San Joaquin Valley. The ozone generated from the photochemical reactions of the air pollutants in turn will cause injuries to crop plants. Airborne pollutants such as ammonia are blown eastward and deposited in the forests of the Sierra Nevada Mountains, upsetting the nutrient balance of these delicate ecosystems. When the animal wastes are collected and applied to land, they again pose threats to downstream water quality.

#### Climate Change

Climate change and warming are likely already occurring in California [can we say this with scientific authority? Need a reference], due to increased local and worldwide levels of carbon dioxide and other gases. Climate change will have significant impacts on the state and on water resources in particular. Already spring arrives earlier, and snowmelt and water runoff begin earlier, forcing changes to operations of water storage reservoirs and hydropower generating facilities. This may eventually lead to changes in water rights if historical storage patterns become untenable. In addition, the distribution of plant and animal may shift in response to changes in temperature and other associated habitat variables. Furthermore, climate change may precipitate an increase in the frequency and severity of catastrophic events such as wildfires and floods with the potential for impacts on both natural and managed ecosystems.

The development of markets for carbon storage is a new trend, and may be an option for landowners whose properties store carbon (e.g., forestry). This is part of a broader trend of compensating land owners for the ecological services provided by their lands, often in the form of conservation easements. The services provided by lands used as wild land, agricultural production, or urban uses differ widely in terms of factors such as oxygen production, surface water flow and ground water storage, carbon storage in plants, wild and domestic animal habitat, native seed banks, etc. [maybe put this paragraph in "solutions" section?]

#### Habitat Fragmentation

Habitat fragmentation is increasing due to increased population pressures and urban expansion into former agricultural and wild lands. [maybe add some text on farmland trusts, multi-species plans, conservation easements? This is already touched on in previous section]

### Invasive Species

Invasive plant and animal species are already a large problem in California with negative impacts on agricultural production, wildlands, and both freshwater and near shore marine ecosystems. For example, the invasive giant reed, *Arundo donax*, grows abundantly in stream channels, choking out other plants, yet breaks off in large chunks during floods to block bridges. Another invasive plant, Tamarisk, uses large amounts of water that would otherwise be used by native or agricultural plants. Exotic fish and invertebrate species are abundant in the San Francisco Bay Delta, and often compete with native species already threatened by massive changes in land and water use. Infectious agents such as West Nile are a concern, and future threats may arise from avian flu and drug resistant *Salmonella*. It is not known how climate change may interact with species invasions to alter the influence of invasive species and infectious agents.

### Closing Remarks /Outcomes

As the state's population increases, housing encroachments brings the urban fringe into the midst of agricultural production areas. The traditional demarcation of urban and rural settings becomes ambiguous and the impacts of the environmental deterioration caused by the agricultural sectors suddenly become more acute as more and more of the human population is in the harm's way.

The knowledge and the practices that made Californian growers successful in the global market are no longer adequate to protect the environment. A new paradigm for agricultural production is needed that minimizes adverse environmental impacts, promotes and maintains ecological balances, and optimizes natural resource utilization, all the while upholding the competitive edge of Californian agricultural producers.

In the next 20 years and beyond ANR will assist Californians in dealing with these environmental and natural resources issues. We will collaborate to develop new technologies to reduce environmental impacts, resulting in improved soil, water, and air quality. This in turn will result in more sustainable agricultural operations, and healthier wildland and aquatic ecosystems. ANR will collaborate with broad stakeholder groups to provide science-based information that will assist legislators and managers in the development of more effective policies and regulations. As California's urban areas expand, and as the impacts on natural resources and the environment are increasingly regional and globally based, ANR's clientele group will expand to include a larger proportion of urban Californians, in addition to its traditional rural and agricultural base.

## **Environmental Quality Design Team ANR Role**

The future role of ANR with respect to environmental Quality Research, Development and Delivery will undoubtedly reflect the projected trends and outcomes as discussed by the Design Team and compiled by Chang and Thompson. Increasing population pressures on natural resources, climate change and waste management and many other factors will have a great impact on research and policy development in the next few decades.

The demand for research in the environmental quality area will be great, and will require that more definitive data be available to allow for appropriate policy and regulatory decisions. The following areas were suggested by the committee as highly important for research:

Land use issues and their impacts, including the transition from agricultural use and natural areas to developed urban and suburban areas will have a great impact on the environment. The ability to definitively monitor environmental impacts of development and other activities is necessary to assist in solving problems associated with development. Methods of risk analysis need to be developed to assess the impacts of environmental activities on endangered species. Plant and animal response to pollutants and climate changes is unknown in most cases. The effectiveness of implementation of best management practices in reducing adverse water and air quality impacts needs to be further examined, as the current recommended best management practices often have uncertain outcomes. ANR is uniquely set up to conduct evaluation of best management practices on a large scale. The development of real-time environmental sensors will assist in providing information on the above topics.

Development of knowledge should focus on several topics pertinent to the areas of research. Land use planning strategies designed to meet the needs of a growing population and at the same time minimizing environmental impacts are highly important. Cost effective management systems for crop production that provide a minimum of environmental impact will be required to keep production agriculture in business. The integration of new technologies for precision agriculture and adaptation of more intensive agricultural production methods to large-scale farming will provide more agriculture's impacts on the environment. The evaluation and monitoring of invasive species of plants, insects and other pests and the impacts of disease and degradation of environmental quality as a result of the presence of these invasive species is an area that will require considerable development. Development of mathematical models and methods of systems analysis will greatly enhance the development areas above.

Delivery of ANR research and development will require that we as an institution determine who is our audience and how best to reach those audiences needing information developed by our programs. Improved and reliable communication is necessary, and the ability to reach and interact with greater numbers of our audience is currently necessary and will be even more so in the future. We need to expand the use of new technologies, and we need to improve, expand the way in which people access our websites. This increased access should include routine use by regulatory agencies and their staff at the local, state and federal level. Interactive websites, for example a diagnostic site for pests, should be employed to provide ANR information to the public. Improved marketing of our products and ANR materials should reflect the preferences of our audience. These products should be available in locations our audience routinely visits-home-improvement centers, garden centers

**Human Nutrition Design Team  
Background Statement  
October 2005**

Poor diet and physical inactivity contribute to health conditions including, but not limited to obesity, diabetes, glucose intolerance, elevated cholesterol, increased blood pressure, orthopedic disorders, anemia and poor pregnancy outcome. In California, five of the top ten fatal diseases (heart disease, cancer, stroke, diabetes and liver disease) are largely affected by poor diet, inactivity, and obesity. California is experiencing an unprecedented obesity epidemic that represents a public health challenge similar to that of tobacco. In fact, poor diet and physical inactivity are the second leading causes of death and disability, resulting in nearly 30,000 deaths each year in California. The prevalence of overweight in Californians has increased from 38% in 1984 to 57% in 2003. While overweight and obesity affect all age, income, educational, and ethnic groups, Californians below the poverty level are disproportionately affected. Especially high rates are found among California's African American, Latino, and American Indian/Alaska Native adult populations. Such high rates of obesity may contribute to other health issues experienced by these groups, such as type 2 diabetes. The economic burden of physical inactivity, overweight, and obesity in adults exceeded \$20 billion for California in 2000 and is expected to rise more than \$28 billion by 2005 for medical care, lost productivity, and workers' compensation. It has been estimated that just a 5% improvement in the rates of physical activity and health weight over five years could save more than \$6 billion, while a ten percent improvement could save nearly \$13 billion.

Between 1990 and 1998, California experienced an increase of 67% in the prevalence of diabetes, from 4.9% to 6.9% of the total population. This trend is thought to be due to the obesity epidemic as excess body weight is a major risk factor for type 2 diabetes. Diabetes disproportionately burdens Latinos, African Americans, Native Americans, and Asian/Pacific Islanders. The direct and indirect cost of diabetes in California per year is more than \$17.9 billion. Over the last two decades, the prevalence of overweight children in California has doubled. Among adolescents, the prevalence has tripled, and one in three children and one in four adolescents are overweight or at risk of becoming overweight. It is estimated that 26.5% of California's students are overweight, 39.6% of California's students are considered unfit, and African-American and Latino youth face higher rates of overweight and poor fitness than White and Asian youth. California children are increasingly suffering from nutrition-related illnesses that normally occur in adulthood, diseases such as obesity, type 2 diabetes and pre-hypertension.

Much of the increase in overweight among children is due to environmental changes that have fostered the genetic expression of a propensity towards obesity. Within our society exist factors that encourage the consumption of large portions of high calorie foods. Coupled with that is the reduced time spent on physical activity by children and adolescents. Even factors occurring very early or for brief periods in life contribute to obesity later in life. These include high birth weight from uncontrolled diabetes, low birth weight, and lack of breastfeeding. In addition, childhood habits as they relate to food choices may persist into adulthood and as a result influence an individual's risk for disease.

The challenges have never been greater. As California's population grows and its diversity increases, our interactive network is continually called upon to solve new problems. Currently our society is faced with a high proportion of youth and adolescents at the same time, as it must deal with the largest aging population ever experienced. Social and economic problems never before encountered are reaching epidemic proportion, and the funds needed to address them are harder and harder to come by. These are among the issues that we are grappling with now.

Successful outreach necessitates the involvement of campus-based extension specialists, other AES faculty, and county-based advisors in a network for conducting research and extending scientific findings to the public. With its research and extension capacities, ANR is already playing an important role in addressing the nutrition and health issues described above. The basic to

applied research continuum is an integral principle governing our research and outreach programs. An important message that we strive to communicate to the public and our constituents is that research conducted at a basic level should be used to help formulate policies, nutrition recommendations, and to provide guidance to improve the health and nutritional status of the individual and populations. Living and working within the counties they serve, our advisors are part of their communities. They have a deep understanding of the problems and difficulties faced by the individuals and families living in every part of California. This enables them to adapt existing programs and develop new ones to address precisely the areas of need in their counties. At the same time, they form a network of trained observers with practical experience in recognizing and analyzing trends, keeping the Specialists and other AES faculty informed about what is really happening in the counties. This interactive process of communication among Advisors, Specialists, and faculty, enables the program to respond effectively to emerging issues in California.

Impacts:

- Nutritional status of Californians will improve.
- Diet-related diseases among Californians will be reduced.
- Health care costs of Californians will be reduced.
- Racial/ethnic disparities in health and well-being will be reduced.
- Pregnancy outcome will improve among all segments of the population as evidenced by reduced maternal and infant morbidity and mortality.
- Iron deficiency will decrease in the “at risk” groups.
- The use of gardens will increase in California schools; children will increase their intakes of fruits and vegetables.

## **Human Nutrition Design Team ANR Role**

Successful applied research and extension activities necessitate a healthy dialogue among university academics, government agencies and community partners. With its research and extension capacities, ANR provides campus-based extension specialists, faculty and county-based advisors with essential expertise needed to conduct research, communicate scientific findings, and mobilize community involvement. The basic science capability of faculty, the applied research capability of specialists, and the strong community links of advisors complement each other in a way that promotes application of basic research findings. In contrast to academics at our University, government agencies have the capacity to propose and implement policies and to fund programs that impact the health and nutrition of our population; and community groups are in the best position to influence and facilitate change as they understand the needs and challenges of their people better than any other single entity. Successful applied research and extension activities occur when university academics (faculty, specialists and advisors), government agencies and community partners work collaboratively to identify research priorities, determine how best to communicate research findings, and evaluate or implement new intervention programs. These interactions inform research priorities that influence policies, nutrition recommendations and strategies for improving the health and nutritional status of individuals and populations. These “multi-way” communications are able to deepen the understanding of the problems and difficulties faced by the individuals and families living in every part of California, thereby informing research priorities as well as program and policy development.

Knowing that poor diet and physical inactivity are important contributors to chronic disease of Californians is a first step to identifying solutions. The next steps, however, pose significant challenges, and require expertise that does not solely reside within a University. For this reason, it is essential that the University partner with professionals in Government and in the Community to address solutions that can reduce co-morbidities associated with obesity. Furthermore, the causes and solutions require multi-disciplinary expertise, necessitating involvement of numerous academics from a range of relevant disciplines. Within the University of California, a model for facilitating effective working relationships among this full range of partners has been developed and tested over the last few years by The Center for Weight and Health. Its mission is to provide leadership for the development of science-based solutions to weight related health problems, with a focus on children and their families. The success of this center illustrates that it IS possible:

1. to assemble partnerships among academics and leaders at the University, in government agencies and in community
2. to foster dialogue between disciplines
3. to provide the infrastructure needed to assemble, manage and promote effective communications and collaborations among large, and diverse teams of professionals

The Center is now recognized across California and the country as an unequalled source of expertise and resources regarding child obesity. It has earned credibility in academic circles and has a reputation for making its expertise accessible to those working at the community level to a degree unparalleled at most academic centers. Because of its flexibility and responsiveness to the realities faced by schools, community-based organizations and other service delivery providers with a stake in child health, the Center is a sought after partner.

Lessons learned during the development of this Center for Weight and Health need to be applied on a larger scale across the State of California if the enormity of the obesity-related health issues of our population is to be adequately addressed. In expanding this model, more leaders would become involved in the process of simultaneous action and evaluation of what works and what does not, and would be enabled to adapt scientific methods to constraints characteristic of applied research without compromising scientific rigor or objectivity. As has been important for this one small Center, the larger enterprise must be able to rapidly produce, synthesize and

interpret collaborative research findings to inform policy and action for the prevention of obesity through the multiple community and societal layers at home, work, school, child care, neighborhood, church, health care centers, industry, agriculture and media..

Obesity rates are increasing in all age groups, in all ethnic groups, and in all socioeconomic groups, yet a single approach to prevention is likely to have limited success. Additionally, the short-term risks and longer-term co-morbidities associated with obesity are not consistent for all populations. Because California has the most diverse population in the country and in the world and because the University of California has such a diversity of expertise and disciplines, the University is in an excellent position to lead the state and the nation in a multi-disciplinary and collaborative effort to develop, evaluate and implement science-based solutions to the problems associated with increased body weight. The ANR is in a strong position to oversee the assembly and functioning of a state-wide network of efforts, using the Center for Weight and Health as a model to expand upon. This network of effort would assemble the expertise needed to conduct and evaluate longitudinal, multi-disciplinary studies that aim to identify factors associated with cause and prevention of obesity and its co-morbidities. This same approach would be used to identify effective, community-appropriate interventions for reducing obesity and its health consequences in high-risk populations. Efforts would aim to understand effective strategies for achieving life-style changes in nutrition and physical activity that would prevent obesity. Using this approach, we believe that a statewide effort in the area of obesity could accomplish the following:

- improve the nutritional status of Californians
- reduce disease associated with poor diet and little physical activity
- reduce health care costs of Californians
- reduce racial and ethnic disparities in the health and well being of our population
- improve pregnancy outcome among all segments of the population

To achieve these outcomes, it will be necessary to:

- a. increase the number of county-based advisors with applied research and outreach expertise in nutrition to a minimum of 1 advisor per 1 million Californians
- b. increase the number of campus-based specialists with nutrition and physical activity expertise to a minimum of 1 specialist per 5 million Californians
- c. increase infrastructure funding to support the staff who can:

- provide technical assistance and liaison among academics in the university, community and government
- organize outreach activities, conferences and seminars
- provide technical assistance and liaison with multi-disciplinary teams of investigators when assembling literature reviews, grant applications and other substantial documents

**Pest Management Design Team  
Background Statement  
October 2005**

Change continues to present the most serious challenges and greatest opportunities to DANR as we strive to develop increasingly complex management options that must meet the expectations of a diverse California population with their differing views on economic, environmental, social, and political sustainability. The types of changes outlined below will require developing new academic structures and linkages, increasing and redeploying existing resources, and expanding our base constituencies and geographic scope, and a renewal of Cooperative Extension. The development of solutions to change does not lie exclusively in the domain of applied science, but often can be found at the nexus of sound science, effective policies that incorporate our current values and goals, and realistic economics. It is not productive to have society continue to pit traditional combatants with trade-offs (e.g. environmental concerns from agricultural practices conflicting with needs to have an economically and politically stable production system). ANR needs to help our constituency

- understand the issues,
- develop solutions ,
- provide an independent analyses of alternatives,
- bridge the science – policy chasm, and
- support outreach to realize these solutions.

Many businesses and industries are recognizing that a failure to address public concerns may result in politically unstable outcomes. Two such examples are public concern over biotechnology developments and environmental or human health concerns raised by endocrine disrupting pesticides. These examples of key, controversial issues in pest management might arise because of a lack of understanding of the underlying science, possibly a lack of data, or potential political and economic conflicts between various constituencies. ANR needs to reestablish its role as a creative, innovative source of solutions to problems pressing our society, as an independent and clear voice for review of controversial issues, and as a liaison between science and the general public, science and development, and ultimately between science and policy.

Below, we argue that three broad challenges that now face Californians will be addressed most effectively by new research, development, and delivery solutions generated by DANR:

1. Oceans that once provided natural barriers to the spread of organisms and no longer insulate us to the devastating effects of invading disease organisms, weedy plants, and destructive animals. The result is the homogenization of the world's biota. This is creating a dramatic challenge to functioning of the worlds agricultural and natural ecosystems.
2. California's urban populations are increasingly being pushed into areas that previously were strictly agricultural. The resulting interdigitation of agricultural, urban, and natural ecosystems is creating tensions, challenges, and opportunities related to pest management and human health.
3. The rapid implementation of transgenic crop plants has revolutionized pest management, decreased the need for broad-spectrum pesticides, but at the same time inflamed public concerns regarding food safety. Major challenges exist in educating the public and developing a sound understanding of the environmental implications of transgenic technology.

**Homogenization of the world's biota**

The homogenization of our world in terms of economic and social contexts has had profound impacts on the traditional constituencies of DANR. Development of global markets have altered the competitive advantages of California producers, reshaped management options to fit international standards (e.g. pesticide residues), and redefined potential consumers to a global scale. All of these factors have made pest management issues more pressing, more difficult to resolve with traditional solutions (e.g. pesticides), and often more expensive, laborious or economically risky.

Homogenization through international travel or shipping is also resulting in a more uniform biota as pestiferous species are moved regularly across local and international borders. The introduction of pest species into California will only increase beyond the current rate **6 per year** (Hoddle reference needed) as global markets continue to mature. Invasive species not only directly affect our precious natural resource base in agriculture, management forests and urban systems, but are adversely affecting our wild habitats as native species are displaced or ecosystem traits are altered (e.g. increased rates of fires in native habitats with introductions of non-native grasses). Recent estimates of factors threatening vertebrate species loss in North America due to invasive alien species was estimated at 47% (Yiming and Wilcove 2005).

These invaders include a broad array of taxa including invasive pathogens (West Nile virus), insects (glassy winged sharpshooter into grape vineyards), crabs (e.g., green crab) aquatic (marine and fresh water) and terrestrial weeds and vertebrates (introduction of the snakefish and potential impacts on native fish populations). Failure to take on the prevention and management of these invaders could prove disastrous for industries such as agriculture, forestry, or fisheries as well as our natural environment. Obviously, issues such as food security or the unpredictability of resources on a global scale present a national and state interest in optimizing the systems to minimize external costs.

Our ability to prevent or address these invasive species will depend on our understanding of their biology, management, population regulation and impacts in their native range, which will require a more global scope of inquiry. Management of invasive species into urban and agricultural habitats such as the example of the red imported fire ant may ultimately depend on understanding why invaders are more benign in their home range, why populations of some pest species in the California are more significant in their growth and impacts, and what opportunities may exist in their native habitats that can be functionally imported as management options into California. Identifying, understanding and prioritizing the risk of potential invaders may prove key to resource allocation decisions and program building.

### **Interdigitation of agricultural, urban, and natural ecosystems:**

Agriculture's relatively isolated geographic positions in California also are changing as our population continues to grow and spread to areas traditionally occupied primarily by managed systems. The increasingly convoluted interface of agriculture with urban or native habitat settings has changed allowable practices at the margins (e.g. setbacks of spraying from waterways), resulted in clashes between management and public concerns for their safety (e.g. broad scale insecticide treatments to manage West Nile virus or Mediterranean fruit flies), and increased regulatory issues with current practices (e.g. increased limitations on allowable aerial drift, increased regulatory oversight of nutrient runoff from livestock operations), or direct clashes between global environmental concerns and local economic needs (e.g. use of methyl bromide and potential ozone depletion).

Change is also occurring in the social aspects of natural resource management. The increasingly urban sector of California, the US, and the world are becoming progressively disenfranchised from the producers, but social demands on the standards and indirect costs of production are only increasing. These demands range from increasing concern about food safety and quality, the increasing costs of agriculture on ecosystems (e.g. creation of hypoxic "Dead zones" caused by coastal algal blooms as nutrient additions from urban and agricultural sectors enter into the waterways (Dybas 2004)), resulting in increased regulations.

### **Biotechnology**

Finally, the academic template for the Agricultural Experiment Station in the University of California continues to change as well. The solutions to many of our current problems often require more complex answers in terms of their development, implementation, and educational requirements. Perhaps the most exciting and promising recent developments have resulted from understanding fundamental aspects of gene regulation and expression as evidenced by the booming fields of biotechnology. The introduction of genetically modified organisms, e.g. Bt cotton or corn, has resulted in increasing farm profits, decreased pesticide use patterns and greater diversity of natural enemies which control primary and secondary pests, and indirectly

enhanced safety for farm workers as pesticide exposures are reduced. Despite these benefits or the promise of even more significant changes (e.g. enhanced food quality, production of more stress tolerant crops capable of minimizing our needs for inputs like water), environmental concerns continue to be raised about the safety of engineered crops (Pilson et al. 2004).

So, the need to strengthen the fundamental underpinnings of ANR to meet these challenges will require a continued commitment to basic sciences and a bridging of basic and applied sciences to develop novel and sustainable management strategies. An important component will be the reinforcing or building new cohorts of academics that can be appropriately rewarded when researching, developing and delivering solutions to California's unique pest management challenges. Effective delivery of these new approaches will be predicated on exploiting the successful model of our existing extension structure while reallocating and increasing Extension resources as new directions are pursued. Simultaneously, it will be important to build new partnerships with our target constituencies. Partnerships will need to be fostered with other international consortia to mitigate potential problems before crisis situations arise in California or to address a relatively unilateral flow of information from the US to other countries.

In short, the pest management problems facing managed and native ecosystems are only increasing in complexity as the world continues to functionally shrink. Management of pest or invasive species will only continue to rise in importance as our understanding of their impacts increase, as new tools are developed that promise the potential for environmentally and socially responsible programs that are economically sustainable, and as the urban-agricultural communities become progressively more intertwined.

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**Sustainability and Viability of California Agriculture Design Group  
Background Statement  
Fall 2005**

California's increasing population is forcing changes to the agricultural landscape and challenging the economic viability of agriculture throughout California. If trends remain constant, by the year 2020, California is expected to have a population of 45 million people, an estimated growth of 500,000 a year. This growth will have impacts on agricultural systems and the environment. If California is to remain competitive in the production of food and fiber as well as preserve our natural resources, ANR needs additional resources now so that critical issues that will impact agricultural production levels can be addressed. Sustainability of agriculture and natural resource stewardship is a priority for the land-grant institutions. ANR's research and outreach can address these issues through the development and delivery of new discoveries that support agricultural and natural resources in communities.

Changes in California's agricultural landscape are anticipated to include: a continued trend towards higher valued agricultural crops displacing lower valued crops. Cropping systems that require greater resources will give way to lower input systems having increased efficiency. However, commodities that are connected to higher end markets such as alfalfa forage to dairy may continue to sustain a higher end milk processing industry. Shifting to non-traditional agricultural land where resources remain available with less urban /industrial issues is inevitable.

Developing eco-friendly agricultural systems in areas that are environmentally protected, habitat-regulated or close to urban interface and favorably suited for agriculture will have opportunities. These areas may be identified with unique soil type, topography, and geographic proximity to urban corridors, water availability, physical and chemical soil limitations or protected areas. Pest management will become more challenging in order to achieve higher food quality demands as well as comply with stricter environmental regulations. R D&D will require combined multidisciplinary collaboration of Campus-based researchers, Cooperative Extension advisors, private and public stakeholders in order to sustain an agricultural business system.

The following issues have been identified as being of significant importance to long-term sustainability of California Agriculture.

1. New crops and cropping systems.
  - a) Developing new crops and markets.
  - b) Agricultural research of cultural practices and management in opportunistic areas less competitive
  - c) Identify agricultural crops and systems that share mutually beneficial uses for wildlife and recreation.
2. Environmental Quality and Natural Resource.

Increasing environmental regulations will have significant impacts on production systems. Water quality standards on agriculture will become stricter as less water will be available for production.

  - a) Developing environmentally sensitive pest management programs.
  - b) Design application and spray technology for fertilizer and crop protection systems.
  - c) Develop technologies that conserve water applications and increase irrigation efficiency.
3. Biotechnology
  - a) Developing new crops, varieties
  - b) Value added products.
  - c) Reduction in chemicals for pest management.

- d) Water conservation and drought resistant plants.
  - e) Alternative fuel crops and technology.
  - f) "Farmaceuticals" plants for medical/ nutritional needs.
4. Improving Air and Soil quality.
    - a) Develop and implement farming systems that lower total emissions of dust, smoke and VOC's.
    - b) Recycling and reuse of crop organic matter to build and sustain soil health.
    - c) Develop application technology for precision spraying.
    - d) Develop practices having alternatives to burning, tillage.
    - e) Leaching and runoff.
    - f) Carbon sequestration.
  5. Develop relationships and bridge connection with Cities and Municipalities in areas of common issues.
    - a) Master Gardener Programs as the vehicle to reach county/city residence for teaching and outreach.
    - b) Address water quality issues from urban areas.
    - c) Research on green waste research recycling and utilization.
    - d) Landscape and water conservation.
  6. Organic Farming systems
    - a) Small family farms
    - b) Farmers markets
    - c) Specialty Crops
    - d) Home gardening
    - e) Biological control
  7. Invasive Species. Develop strategies for intervention, prevention, eradication and control.
    - a) Weeds
    - b) Insects
    - c) Pathogens
  8. Waste Management
    - a) Dairy and Livestock manure management
    - b) Municipalities' sewage and sludge utilization.
    - c) Green waste utilization.
  9. Food Safety
    - a) On farm production and harvest practices
    - b) Processors, handlers
    - c) Consumer Education

## **Sustainability and Viability of California Agriculture Design Group ANR Role**

### **RESEARCH**

Innovations in agriculture developed through UC research will be the driver that enables California agriculture to meet the challenges of the next 20 years. The changing face of agriculture will require research efforts to be focused in new directions. Increasingly, California agriculture is competing with other countries for market share. In particular countries with lower labor and land cost and with less stringent environmental regulations are able to produce food at a competitive advantage. Therefore, the future of California agriculture should focus on high end market crops and on crops which require the unique climatic and growing conditions prevalent in California. Future research should be focused on these farming systems to fully explore the advantages of these farming systems. Future research must take a holistic view by integrating its production with environmental issues, in particular water use and allocation and the quality of air and water.

- Farming in marginal environments e.g. high salinity I STILL DO NOT KNOW WHY CA SHOULD FOCUS ON FARMING ON MARGIANL LAND (cvk)
- Reducing agricultural water use
- Desalinizing water
- Containing exotic pests and invasive species
- Co-existence strategies for different agricultural production systems and urban areas
- Strategies for air and water pollution abatement
- Techniques to reduce dependence on agricultural labor e.g. mechanized systems
- New products to access high-value niche markets
- Renewable energy and industrial crops e.g. biodegradable polymers

Multidisciplinary research will be essential to address these research topics. UC has the multifaceted expertise that is required to successfully carry out this type of research.

### **DEVELOPMENT**

Basic research needs to be integrated into agricultural systems and tested in the field to examine how the technology performs in production settings, and assess how it impacts the environment and the viability of the production system. Whereas in the past UC had field personnel, experience, and technical proficiency to make it uniquely suited to develop and evaluate, due to budget cuts, there has been a considerable reduction in researchers and extension staff impacting the development and delivery of knowledge to the stakeholders. One of the first priorities would be to regain strength by attracting researchers and extension personnel.

- Farming systems that require less inputs (energy, water, pesticides, tillage, labor)
- New high-value crops for California agriculture and improved varieties that require fewer inputs (e.g. water, pesticides, fertilizer)
- Sustainable production systems for entertainment agriculture (eg. floral, turf, commercial landscapes, horticulture for hotels)
- Management guidelines to improve soils on farms and urban landscapes
- Preharvest and postharvest production/processing practices to ensure a safe food supply
- Biosecurity plans for California plant and livestock production systems
- Farming systems that take advantage of the common mutual interests of recreationalists and agriculturists

The development of viable farming systems that enable California to balance environmental stewardship, economic development, and community vitality will help to protect agricultural land and the intangibles associated with open space (e.g. aesthetics, wildlife habitat). This type of applied agricultural research has great public benefit, but has been increasingly less supported by

public funding over time. There is a need to ensure funding is available to encourage faculty to pursue applied research in this area, and to support graduate students interested in carrying out field-based research.

## **DELIVERY**

The goal of the ANR is to enhance societal welfare by advancing scientifically sound strategies to produce abundant, healthful food while reducing the impact of agricultural production on the environment. ANR provides leadership to coordinate research, and delivery focused on sustainable management of natural resources and agricultural production with environmentally sound practices. This includes integrating and interpreting discoveries from diverse areas of research to articulate a comprehensive set of principles for sustainability, while engaging scientific and stakeholder communities. ANR must meet the challenge of increasing the production of healthful food, without damaging the environment, in the face of a world population that doubled twice in the past 100 years to more than 6.3 billion, and is expected to reach 9 billion by 2050.

California agriculture accounts for more than one-half of the U.S. production of the fruits, nuts, and vegetables necessary for heart-healthy, anti-cancer diets, and is the nation's leading dairy state. Sustainability of this productivity will be challenged by a predicted 25 million more Californians by 2030, on a land base that is rapidly declining due to unsustainable production practices, urban expansion, and habitat destruction.

Although technology and innovation underlie tremendous productivity gains, they often have unintended impacts on our most important and essential resources: biological resources, productive land, clean air, and unpolluted water. There is a need for a focused ANR effort on sustainability in agriculture in the context of preserving natural resources and human well-being. California's urban pressures, unparalleled productivity, and a significant proportion of the population increasingly focused on how food is produced. ANR, as part of the UC system, is uniquely positioned to lead the world in agricultural sustainability research and delivery. ANR should promote multidisciplinary research on sustainability of agricultural and natural resources within existing areas of excellence at UC Davis and deliver the knowledge to consumers, producers, stakeholders, donors, and the rural and urban public.

Focused efforts on sustainable agriculture also promise to enhance societal welfare in ways that go far beyond food production. For example, plants and animals provide naturally occurring compounds that improve human health, such as antioxidants and biofortification. Increasingly, crops will provide biofuels as alternatives to fossil fuels and contribute to a cleaner, safer environment. Plants and animals can also be modified to produce biopharmaceuticals. UC will emerge as an international leader in research and education in science-based sustainable production of food, pharmaceuticals, and energy sources while conserving and improving the quality of biodiversity, land, air, and water. If UC fails to meet these challenges, all other progress in improving the well-being of humans will become irrelevant.

The importance and strength of UC research is that it is generated and communicated free from commercial or political influence. The decreased investment in public agricultural research has increasingly resulted in the generation of research data by private researchers and NGOs. This data is not subject to the scrutiny of peer-review, and is frequently unbalanced. UC generates science-based, peer-reviewed information and is beholden only to the taxpayer. This information is freely available and is utilized by agricultural communities, local and regional governments (e.g. research to address water quality problems), and urban clientele (e.g. urban horticulture). It is difficult to quantify the value of this type of information to the state of California. UC's current outreach efforts are broad in nature and include research-based information on the ecological and economic sustainability of different agricultural systems, biosecurity of agricultural food production systems, integrated pest management, food safety, and consumer nutrition programs.

Many different industries and segments of agriculture utilize information generated by UC. Research-based information must be made accessible and appealing to all potential target

audiences, including the large urban sector of California's population. The future sustainability of California agriculture will depend upon a seamless continuum linking UC's basic research to applied research, development and delivery programs. The county-based Cooperative Extension delivery system works extremely well but is under funded. There is a great need to ensure that funding becomes available to revitalize this important component of the delivery system.

The role of AES faculty in contributing to fulfill the land grant mission has to be reevaluated. A key strategy to strengthen the input of AES faculty is to ensure that faculty hired with a AES appointment are made well aware when they are hired of the AES responsibilities.

## **Sustainable Use of Natural Resources Design Team Background Statement**

California is changing. Its population has been going up steadily for the last 150 years, and projections indicate that this trend will continue, with more than 50 million residents in the state by the year 2050. Accompanying this rising tide of people are substantial demographic changes as well. Today a far greater percentage of Californians live in urban areas. These new urbanites often view the land outside of cities in much different terms than their rural predecessors. Whereas those who grew up on farms or ranches had a much more intimate relationship with nature and the environment outside their houses, those living in cities today may view wildlands as remote, mysterious, and even threatening. Such individuals often have a poor understanding of why rural landscapes, and the natural resources imbedded in them, are so vital to their own way of life and their standard of living. And if people don't understand the value and importance of natural resources and the myriad benefits they provide, they will likely be unable to make intelligent decisions about their management and conservation.

The surge in California's population also has direct effects on natural resources. In general, resources such as forests, water and wildlife are finite and limited and the more people that share them, the less there is to go around. Water is an excellent example. While the availability of water for fisheries, agriculture and domestic uses varies considerably from year-to-year based on annual rainfall patterns, on average the amount of water available to the state's residents is relatively static. More people mean less water per person. In "good" rainfall years this may be immaterial, but in drought years, conflicts between competing uses will become exasperated by a larger population and increased demands. Without effective intervention, the difficulties witnessed in the Klamath Basin several years ago may become the norm, rather than the exception. A growing population, therefore, further emphasizes the need for good stewardship and management of a limited natural resource base.

Educating the state's residents about natural resources and their management presents numerous challenges. As stated above, many people just don't have the background, education, or experience to understand the values that wildlands provide. Some have come from other states or countries and just aren't familiar with the incredibly rich, diverse, and productive resources we have here. Others may just not think about them much. They may know that milk comes from cows, lumber from trees, and water from snow pack, but how range, forests, and watersheds should be managed is not something they are likely to spend a great deal of time thinking or worrying about. They may also appreciate the scenic beauty they see when driving in rural areas, but don't know that many of California's wildlands, especially in the lower elevation foothills, are privately owned and effective management must address how these landowners can continue to make a living on their property. They may also appreciate recreational opportunities such as hiking and picnicking, but not realize that some of the areas they visit are ecologically sensitive and may be at risk from fire or other potential disturbances.

The University of California and the Division of Natural Resources (DANR) can and should be a leader in natural resource research and education. Unfortunately in this era of diminished state and federal budgets, there are a plethora of competing demands for the money that is available, and some partners UC has traditionally worked with may not be able to contribute as they have in the past. On the plus side, there have been enormous advances in technology and the emergence of innovative communication tools that can facilitate the dissemination of information. In any case, it is vital that UC carries on its outreach mission so the population at large knows how natural resources benefit them and understands how adverse impacts to these resources can and will affect their lives. Fire is a case in point. Most everyone knows that fires occur in California and can be very destructive, but few understand that the threat of catastrophic fire is greater today than it was 75 years ago, at least in part because of a century of fire suppression and the resultant accumulation of combustible fuels in the understory of many of California's forests. A well-educated public will support efforts to address these problems and promote strategies such as prescribed burning or thinning that can help reduce fuels and the threats they

pose. Knowledgeable citizens will also be more supportive of efforts to ensure that renewable resources such as fisheries and timber are sustainably managed to produce much-needed products, as well as the other services and amenity values that forests and oceans provide.

So – what are some methods the Division can use to educate the public and raise awareness of natural resources? While the traditional Land-Grant model of working with large resource owners and managers still has its place, in this new era, alternative approaches are also needed to reach out to an ever-changing and extremely diverse clientele. We need to educate urban residents who, as stated above, may have had relatively little direct contact with the state's wildlands. Reaching out to children and young adults can often be particularly effective since children often talk to their parents about what they have learned, thus multiplying those who receive the information. We would therefore like to see natural resource information more prominently featured in school curricula and in 4-H programs.

To directly reach adults, a Master Natural Resource Program, based on the enormously successful Master Gardener's Program, is being explored with a pilot program in the North Coast. Such a program is particularly appealing because it not only educates interested parties about natural resources and their management, but it provides an outreach mechanism that can spread this information far and wide. This method potentially has a huge "bang-for-its-buck" since it relies largely on volunteers to educate the public.

It is also worth noting that effective education in this "new" California must take into account the fact that many residents may not have English as their first language. Natural resource materials should therefore be widely available in Spanish, and perhaps other languages, to help ensure that those who don't speak English don't miss out on this educational opportunity.

Finally, the University and the Division must explore new partners and clientele. Collaboration will become essential since there simply won't be sufficient resources for different groups to effectively do everything on their own. Fortunately the University is well poised to take a leadership role in such collaboration since it has an excellent reputation as a source of timely, pertinent, and unbiased information. It has world-class researchers and a network of Cooperative Extension Specialists and Farm Advisors who are second to none in their ability to disseminate information. These new clientele groups include watershed groups and land trusts. Watershed groups are generally assemblages of landowners and managers – both public and private – that share common concerns and interests since the resources they are managing are interconnected and affect each other. Land trusts promote and facilitate a relatively new conservation tool – conservation easements – that restrict future development options. Landowners who put their property into conservation easements can continue most normal management activities - hence are able to manage these properties as "working landscapes" – while at the same time ensuring that these lands aren't developed and will retain their wildland character in perpetuity. However, both watershed groups and easement managers often have many questions as to how to manage their properties most effectively and the Division can work cooperatively with these clientele groups to help meet this need.

Clearly there are enormous challenges facing California in terms of making the best use of our natural resources and developing methods to manage them sustainably. But UC and DANR can contribute immensely to this effort and help ensure that the California we pass on to our children and grandchildren will retain the rich and diverse natural resources our state is blessed with (*this is where we queue up Handel's Messiah*).

## **Sustainable Use of Natural Resources Design Team ANR Role**

The task of identifying the role of ANR to meet the needs of Californian's on the subject of sustainable use of natural resources over the next 20 years is arguably preposterous. Who in 1985 could have predicted the societal and economic changes that have occurred during the past 20 years? The inconceivable advancements in technology and communications, coupled with continual population growth and demographic shifts have caused soaring land and home prices that have impacted water, forests, air and land. The resultant social and political reactions from these changes have created a regulatory and political environment unparalleled in the rest of the country. Nonetheless, the University of California has an obligation in the face of the predictable changes that will occur over the next 20 years to attempt a strategic planning process that will position the University to provide leadership in an ever increasingly complex society.

Obvious trends, projections and opportunities over the next 20 years include:

- Population increases will lead to fragmentation and urbanization of forests and wildlands affecting water, wildlife, fisheries and air resources,
- Emerging communications technology will continue to decentralize urban "work centers" allowing more people to emigrate to and work from wildlands,
- This shift of demographics will provide opportunities to develop new constituencies. Opportunities for new program themes i.e. Master Naturalist programs to develop urban and exurban political base for natural resource management and education,
- Water allocations will most likely continue to shift away from agricultural uses to urban audiences,
- Air quality issues will continue to impact agricultural practices affecting profitability and practicality of operations in urbanizing areas,
- Half of California's landscape is publicly owned. There is no systematic arrangement between agencies and local jurisdictions to address recreation and extraction impact issues. Federal and State resource agencies and others are looking for information and leadership in the face of dwindling resources. ANR could be the R&D for them.
- Pacific Rim countries, companies and resource agencies need expertise in managing and developing their own natural resources. We currently provide assistance at no cost. Tremendous opportunities for partnerships and contractual agreements will exist.
- Marine resources will continue to face enormous pressures from both commercial and recreational uses.
- The need and demand for fiber production will continue to expand. Alternatives to native forest extraction will be needed. Biotechnology may play a role in the development of fiber forests however; political and social issues will continue to plague the subject matter unless the public becomes more comfortable and accepting of the technology.

The role of ANR in providing leadership to address the sustainable management of natural resources in the face of these realities will require the Division to frame the key themes and

issues through the integration of science-based research and information into management and policy.

In the role of Research this will include:

- Cross disciplinary approaches to address complex ecological issues.
- Policy and non-consumptive resource valuation investigations to monitor impacts of a demographically complex state.
- Identifying non-ANR UC resources to include science-based information into management and policy education i.e. climate change research.
- Identify research funding resources through contractual collaborations with non UC entities (agencies, environmental groups, etc.) to address the erosion of research-based activities that were traditionally part of the mission of these other entities e.g. water, forest, land and air management.
- Identifying cultural and language barriers impeding delivery of science-based natural resources education to non-English speaking citizens.

In the role of Development this will include:

- Expanding the concept of the Natural Resources Coordinating Conference to include partners and collaborators to expand the reach of ANR-based information.
- Addressing the currently inconsistent level of training, certification and licensing of individuals developing various resource management plans (EIRs, THPs, etc.) and the lack of continuing education requirements among practitioners affecting California's natural resources.
- Develop alternative /integrated units to bring together teams to work on specific subject matters of importance similar to the IPM/IHRMP models.
- Delivery methods appropriate to outreach to non-English speaking citizens.

In the role of Delivery this will include:

- Expand undergraduate curriculums to insure science/scientific thinking and relevance of science to their lives after graduation.
- Recognition of the needs of new clientele base and development of innovative delivery methods to meet exurban residents in traditionally rural areas of the state e.g. Master Naturalist program.
- Advocacy of science-based research and information in the development of natural resource policies.
- Recognition of the impediments limiting outreach capabilities to non-English speaking cultures and working collaboratively with key members of this growing section of California's citizenry to improve UC's role in their lives.

In order to affectively initiate positive change, ANR's primary role must be full engagement at all levels in creation, development, and delivery of science based information to those making decisions on the management and policies of natural resources for the state of California.

**Youth Development Design Team  
Background Statement  
October 2005**

*“No one is born a good citizen; no nation is born a democracy.  
Rather, both are processes that continue to evolve over a lifetime.  
Young people must be included from birth. A society that cuts itself off from its youth  
severs its lifeline; it is condemned to bleed to death.”*

--Kofi Annan, U.N. Secretary-General

Research has shown that the authentic and meaningful engagement of young people in communities has multiple levels of benefit: to the youth, to the adults who work with them, and to the organizations and communities in which they are engaged. In addition, the benefits of youth engagement are both short-term and long-term. In the short term, youth gain a sense of belonging and develop mastery of important life skills. They make real and substantial positive contributions to communities. In the long term, research has shown that when we support youth in being engaged in their communities, they grow up to be adults who are far more likely to be civically involved and who give philanthropically.<sup>1</sup>

However, compared to previous generations, today's youth participate in school leadership, clubs, and other organizations at substantially low rates<sup>10 11 12 13</sup>. Some argue that this trend is due, at least in part, to the decline in civic instruction in schools<sup>33</sup>, and in other opportunities for civic participation in the community. Low rates of civic engagement may also be attributed to increased residential mobility, over-use of television and other media, and social exclusion related to population diversity.

Recent trends in housing and transportation are making it increasingly difficult for families to spend time together as many families now live far away from the areas in which they work<sup>26</sup>. The average length of a round-trip commute to work in California is now nearly 1 hour<sup>27</sup> leaving youth unsupervised. Even youth themselves are concerned about not having enough time with their parents, ranking this issue as their greatest concern, above external pressures regarding drugs and alcohol<sup>24</sup>. Lack of connection with parents and other adults can leave youth vulnerable to later risk related behaviors<sup>25</sup>

Increasing media use by youth has detrimental effects on civic engagement.<sup>28</sup> Youth spend an increasing amount of time using television and other media which compounds the problems caused by lack of adult involvement. Thirty-six percent of families reported that their teenagers spent more free time watching television and using computers than interacting with parents<sup>25</sup> and 61% of children say they are watching TV without any parental supervision<sup>25</sup>. The average US teen is exposed to 7.5 hours/day of TV, videos, movies, music, computers, and video games<sup>6</sup> although TV remains the most dominant form of media used by youth today<sup>7</sup> with nearly two-thirds of US teenagers having a television in their bedroom<sup>8</sup>. Media use is related to a host of poor outcomes for children, affecting their attitudes and beliefs, school performance, weight and health, risky behaviors, aggression, identity formation, and political views (for a review, see<sup>7</sup>).

While civic engagement of all youth is on the decline, Hispanic youth demonstrate consistently lower rates of civic engagement than do other ethnic groups. They register to vote and volunteer less frequently, and report substantially less belief that they can make a difference in the problems facing their communities than do most other ethnic groups<sup>11 33</sup>. This is a particularly crucial issue for California as the population is more diverse than the nation, on average, and this diversity continues to increase steadily especially among Hispanics, especially children and adolescents.<sup>2, 3</sup> In fact, Hispanic is the largest ethnic group among children and adolescents.

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<sup>1</sup> Independent Sector (2002). *Engaging Youth in Lifelong Service*. Washington, DC: Independent Sector.

While civic engagement among youth declines, support for programming to enhance civic engagement is lacking, particularly within schools, which have the ability to reach the largest number of youth.<sup>33</sup> Current school policies around the nation have been shifting priorities toward uniform standards, accountability, and high-stakes testing, leaving little room for activities that promote civic engagement. This increased focus on accountability standards has stimulated a re-allocation of educational resources. An increased percentage of funding must be set aside for testing, and for reaching “at risk” schools. Curriculum dollars are also shifted toward subjects directly tested for accountability, namely math and reading, narrowing the educational experience of students. New movements are also working to determine teacher salary and tenure by these narrowly defined student outcomes. In addition to these national accountability standards, California instituted a high school exit exam that students are required to pass before obtaining a diploma. Although this exit exam was enacted in 1999, the class of 2006 will be the first group of students prohibited from graduating without a passing score, thus the full impact of these shifting standards will not be known for some time.

Research suggests that civic engagement is important for skill development, particularly leadership and public speaking, self-esteem, academic achievement, and later participation in civic life as an adult.<sup>32</sup> Youth who are civically engaged today are more likely to be productive members of their communities as adults and more likely to stay rooted in the community in which they live.<sup>28</sup> .

Given the importance of civic engagement in the well-being of youth and communities, it is vitally important that investments are made toward understanding community, family and social factors that support the development of civically engaged youth and influence their long-term participation in democratic processes. Nationally this topic has gained increasing attention with prominent groups such as The Pew Charitable Trusts, The Carnegie Foundation and The Kellogg Foundation supporting opportunities and program efforts aimed at civic participation of youth. However, there are few efforts to systematically document the factors that predict civic engagement; nor does the research clearly identify the “best practices” for supporting youth civic engagement over time, such that effective programs can target efforts in an efficient manner. California, a state with unique trends in population diversity, economic growth, and residential mobility, can play an important leadership role in developing this understanding.

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## **Youth Development Design Team ANR Role**

The University of California Division of Agriculture and Natural Resources (ANR), in its youth development research and extension programs is an under-utilized resource for the state of California. Through its organized research and extension education work ANR Youth Development is a force for the betterment of the youth and all people and organizations in the state. Over many years the professionals within the Youth Development area have worked to identify, anticipate and address a multitude of issues related to youth and their development. New issues addressed include ones related to social isolation, connectedness, resiliency, leadership, bullying and a host of others. The unique capacity of ANR Youth Development to address such a range of issues comes from its structure of locally based academic staff and program managers who are linked to the faculty and researchers at University of California campuses across the state and to Land Grant institutions throughout the country. ANR personnel on campuses and in counties throughout the state continue to address these issues and focus on new challenges through applied, problem solving research and inquiry. But what makes ANR unique is that added to the research are the organized efforts to extend and diffuse the results to other youth serving programs as well as the efforts to apply these findings to local efforts. The prime example of the latter has been the nearly nine decades of work associated with the 4-H Clubs and other youth development efforts.

In the decades ahead the Youth Development research and educational outreach work of ANR is envisioned as an enhanced and expanded resource for the people, for the youth serving organizations, and for the communities of California. It will continue to be a source of learning, a beacon for information dissemination to organizations, and a clearinghouse of practical and useful information for those who work in youth development. As well, ANR Youth Development is positioned to transform its past approaches and to develop and extend new models that are responsive to the ever changing communities, issues and problems related to children and families in California.

ANR Youth Development will be a leader in useful research and application of what is learned in the fields of youth development. Products will include innovative youth programs, new models, and systems that provide evidence that outcomes of inquiry and research are put to use. This initiative will allow ANR Youth Development to target, expand, and extend its efforts in the field of civic work, engagement and youth governance. The results of this work will be shared with youth organizations and the increasingly demographically complex communities throughout the state. The research outcomes and educational programs will form the foundation upon which communities can more effectively work to address the problems needed to reduce social isolation and enhance the status of children and families in California.

The specific components to this initiative will be:

WE HAVE A MIX OF IDEAS ON THE NEXT SECTION THAT WE WILL SUGGEST. THESE INCLUDE, BUT ARE NOT LIMITED TO:

The need to be highly useful to communities seeking to provide high quality youth development programs and interventions.

The need to conduct longitudinal studies.

The development of training models, modules and materials, as well as programs.

The need to address in new ways the challenges associated with an ever urbanizing state and an increasingly culturally complex state.

The need to address issues related to the improvement of life skills and workforce

## Food Safety Design Team

Food Safety Design Group  
DK's summary notes  
October 14, 2005

### Summary

Goals for our food system include increased quality of life, viable farm markets and economics, and enhanced consumer health. The food ecosystem begins with environmental contributions from air, water and land, and ends at consumption of foods that are increasing selected, stored and prepared by third parties.

Societal, cultural and global changes impact the safety and defense of our food ecosystem. Risks of food-borne disease change with changing eating preferences. Today's popular novel foods represent different microbial threats from those previously seen, and there are new emerging food-borne illnesses associated with changes in production, processing, storage, preparation and eating patterns.

There are wide variations in both domestic and foreign food ecosystems. These impact the risks to food safety and the security of the food supply and associated economies. The principal risks are from accidental and intentional introductions of disease-causing microbes and chemicals.

Food is produced from production units that exist with different practices, values, regulatory oversight, environmental quality, market forces and expertise. Changes in practices, including larger commingled batch sizes, increased distances from harvest to consumption locations, differing processing and packaging systems, and variations in surveillance systems and quality control procedures all contribute to a more vulnerable food ecosystem.

The complex food ecosystem requires multidisciplinary teams capable of applied and fundamental research purposefully organized to deliver science-based solutions to California and beyond.

### Points captured from the meeting

Changing societal and cultural demands for food choices and food safety, and the nationalization and globalization of the food supply, have created increased expectations for year-around food availability and a seamless food supply capable of delivering an ever increasing selection of specialty food items to local markets at acceptable prices. At the same time, tolerances for problems with the safety of foods, and interruptions in the food supply, have decreased.

The food industry is extremely complex, with the average US grown food item traveling more than 1,500 miles from harvest to the site of retail sale. In some cases there are more hands touching food, coming from different environmental ecosystems, often associated with different production practices, and with commingling of lots, large batch sizes, and minimal inspection on the way to market. In other cases organizational change such as vertical integration, lot identification, and quality control systems have reduced the potential for contamination or amplification of a food borne pathogen between production and consumption.

Today's food systems represent increasing levels of global movement, introducing different ecosystem dynamics, values and issues. With less than 2% of imported foods undergoing inspection, there exists an opportunity to develop systems to differentiate California's products toward higher value based on safety, quality and production systems.

California's economy enjoys rare and fertile soils, high quality water, climates that support the

growth of many unique crops. The application of capital, technology, genetics, and advanced management methods will continue synergize with our unique natural resources to support California and her people.

There exists a need to create a UC system capable of rapidly addressing issues in an organized fashion focused on finding science-based solutions and effectively delivering them to users.

Approaches include risk assessment to identify priority areas of attention, creating solutions that help prevent, detect, respond, recovery, communicate, and build the human capital required to address current and future issues, and effective delivery of knowledge and technology to users.

Outcomes include a functional awareness of the issues and relative risks, increased science-based knowledge about the key controls of threats, skills and approaches allowing citizens, government and academics to successfully address the issues, and developing the people with the ability to deal with today's and tomorrow's problems.

We can foresee changes in food systems responding to market demands, including market-driven standards, high value products, more fresh and perishable products, niche products, products that are produced using practices that segments of society prefer, and affiliated products including additives and supplements that appeal to market segments.

Threats include microbes such as viruses, bacteria, fungi and parasites, natural or added toxins, contaminants capable of causing harm through their physical properties including prions, reservoirs of these disease-causing agents that harbor them in production, processing, transportation, storage, and preparation environments, and mechanical and biological vectors that serve to move them into the food chain. Contamination may be accidental or intentional.

There is need to move beyond our traditional fragmented approach toward an organized method of solving relevant problems with multidisciplinary teams pursuing a systems approach, based on:

- A functional continuum of fundamental research, applied research and delivery/technology transfer

  - Effective relationships between users and academics

  - A focus on activities serving California's needs (the public's interests)

  - Using a mixture of public and private, domestic and international resources