Linkages

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SPECIAL FOCUS: LANDUSE- WATER LINKAGES

WATER AND LAND USE

By John Hopkins

Land use and water are inextricably linked in any landscape. The linkage is especially strong in California, with its great flood and drought potentials, huge demands on a finite and uncertain water supply, and fragile aquatic ecosystems. But most land development in the past 150 years has occurred as if none of these problems exist.

Our society happily allows development in flood plains, placing blind faith in technological fixes like levees. We do not require guaranteed, long term water supplies before allowing major new development to proceed, even though our water supply is very oversubscribed. We do not link new metropolitan water supply and wastewater systems to Smart Growth measures and avoidance of suburban sprawl. We pay little attention to downstream impacts of a development or to the overall health of aquatic and riparian ecosystems. We are just beginning to recognize the extensive yet unnecessary pollution and extra flood flows caused by stormwater runoff.

This issue of *Linkages* focuses on some of these land - water connections. It is possible to address many of the land use and water issues by the integrated approach of watershed management, the subject of our first article. Here local interests work together to develop and implement a watershed plan, recognizing that many land based activities across the watershed impact water quality and the ecological health of stream and river corridors.

Nonpoint source pollution from city streets, agricultural fields and other diffuse sources is now the major cause of water pollution. The Federal Clean Water act requires control of this pollution. In Los Angeles, the Regional Water Quality Control Board recently mandated stormwater control for new development. Statewide, there is now a Nonpoint Source Pollution Control Program. We examine how to address urban stormwater runoff in conjunction with new metropolitan development, using innovative site design approaches.

A third article looks at the hope for integrated flood control and ecosystem restoration planning for the Sacramento and San Joaquin Rivers. In addition, we address the need to link issues of water supply and new development, including adherence to Smart Growth principles, an issue that still stymies the state's legislators.

Together, adoption of these approaches in the first part of the 21st Century will dramatically reduce the impacts of humans on our landscape. These changes will increase the sustainability of our communities, reduce the potential for catastrophic floods, improve the health of our rivers, streams and coastal waters, and curb suburban sprawl across our farmlands and wildlife habitats.

Inside this Issue.

News from IEH

Urban Villages and Nature

We have just completed the report *Ecological Planning and Urban Village Design.* This project was a collaboration with the Community Design and Planning Services (CDPS) at the University of California, Davis. Funding by a U.S. Environmental Protection Agency, Region 9 Sustainable Development Challenge Grant made this project possible. The report is a toolkit on how to provide urban natural areas in conjunction with the development of urban villages - compact areas with a variety of human uses and a high quality of life. The toolkit focuses on California's Central Valley, but is applicable to other areas. It is part of CDPS's larger project on designing urban villages for the Central Valley, an approach that will improve cities and reduce consumption of farmland and wildlife habitat.

Maintaining and restoring natural areas in cities both improves the quality of life for local residents and can provide significant wildlife habitat. The urban context does limit wildlife values. It is important to consider key ecological principles in order to understand these limitations and to design urban natural areas that have the highest possible biological value. So the report examines the scientific background and principles, factors that affect the biological usefulness of habitat areas, and the extent to which urban habitat can provide for wildlife.

Much of the toolkit address two topics - biological design issues for different urban habitat types and metropolitan design planning that couples urban villages with a system of natural areas. Urban stream corridors can play a particularly vital role. To do so they must have a significant width (600 feet is a good minimum), possess natural vegetation such as riparian woodland, and have a natural stream channel instead of a concrete drainage ditch. Stream corridors that are wildlife habitat will improve the quality of the human environment a great deal, and allow more effective approaches to local flood control.

Contact IEH (see box on this page) to obtain a copy of the toolkit.

Conservation Planning

Currently IEH devotes very considerable energy to development of the South Sacramento County Habitat Conservation Plan (HCP). While this is a comparatively local issue, we believe it has importance across the state and beyond. HCPs are highly controversial in scientific, environmental and agricultural circles because there are many poorly crafted HCPs (see *Linkages* issue #5.) Our goal is for the South Sacramento County HCP to provide a model of "how to do it right".

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Linkages

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WATERSHED MANAGEMENT - LINKING LAND AND WATER

Until our society undertakes major changes in land use planning, we will not be able to adequately conserve rural landscapes or to create the best human communities. Effective land use planning and management calls for integration of a range of issues, extending to topics like transportation, air pollution and water quality.

This is the case because the issues are inter-related, so decisions in one arena affect other concerns. For example, housing densities used for new development affect the extent of farmland and wildlife habitat loss. And the best solution to a problem may be action on a seemingly different issue. For instance, key improvements in air quality require changing the patterns of urban land use types, patterns that affect how much people drive (see column on page 7). Most local governments, however, continue to plan separately for related issues. Also, neighboring jurisdictions usually ignore each other or even compete, often to the long-term detriment of all parties.

Watershed management is one planning approach that does integrate a range of issues, in this case around the themes of improving water quality, protecting or restoring riverine and riparian habitats, and often flood control. In addition, many watersheds, even those for small streams, involve more than one local government jurisdiction, and so force a degree of cooperation.

There are two basic parts to the watershed management story - this integration of multiple issues and the process for developing and implementing a watershed program.

Effective watershed management programs also include extensive data collection, scientific analysis and monitoring. These activities allow watershed management councils or other oversight bodies to make decisions based on the best available information. They also allow adaptive management - changing implementation activities when the monitoring and data say that initial approaches do not achieve the desired results.

Integrating Issues with Watershed Management

There are strong relationships between how we use land and the health of our rivers and streams. As a result, watershed management must address a variety of land use issues across the whole watershed in order to meet key goals.

Water moves through the entire watershed, flowing from the upland areas toward the stream or river. Also surface water percolates into underground aquifers and in places this groundwater flows into local streams. So upland activities that affect the flow or the quality of water impact the health of both waterways and groundwater.

In addition, there are strong biological connections between aquatic, riparian and upland ecosystems. Many animal species utilize multiple habitats. A variety of ecological processes link the different ecosystems.

Furthermore, watershed managers realize that environmental, economic and social needs are inter-related. Actions to meet environmental goals need to mesh or benefit the economic and social needs of local communities in order to succeed over the long term. Similarly, societies whose economies and social fabric are not based on environmental health are not sustainable and will not prosper over the long-term.

Watershed management must address a variety of land use issues across the entire watershed in order to meet key goals.

The precise concerns vary from watershed to watershed. In rural areas, topics usually center around stream health, conservation and restoration of wildlife and habitat, agriculture, forestry and the well-being of small human communities. In urban areas the situation is often much more complicated, involving an array of water pollution, ecological, land use planning and social issues.

Developing and Implementing Watershed Programs

In recent years, we have seen a shift away from projects run and implemented by government agencies to voluntary, cooperative approaches that involve the various stake-holders. Watershed groups that use consensus-type stakeholder approaches to both development and implementation of management plans are springing up around the country.

This approach is beneficial partly because management actions go beyond the confines of current laws and regulations, and partly because success requires the cooperation of the wide array of landowners in a watershed, many of whom are better moved by

collaborative efforts than by government requirements. From the successes and shortcomings of watershed management projects around the nation, we can see what works and what is just too much for a voluntary, stakeholder consensus approach.

Watershed approaches and projects vary. For very large watersheds and entire river basins, projects are often agency driven and focus on a single issue, or a small cluster of issues. The CalFed process, with its emphasis on restoring the ecological health of the San Francisco Bay-Delta, is perhaps the closest to a watershed approach. Its focus extends up the Sacramento and San Joaquin River systems, since water flows and quality have profound impacts on the Delta. But it does not stray far from aquatic-riparian ecosystems and adjoining wetlands.

Another example is the current Sacramento / San Joaquin River Basins Flood Control planning process, under the joint leadership of the U.S. Army Corps of Engineers and the state's Department of Water Resources. This project has the twin goals of enhancing flood control and restoring riverine and riparian ecosystems (see page 9).

Use of stakeholder based watershed groups, or watershed management councils, is an excellent way to address problems in smaller watersheds, especially rural watersheds with forestry, grazing and farming practices that impact both the waterways and overall ecological health.

A Tale of Two Creeks

Ex Examination of two watershed projects in California's coastal region underscores how different the issues can be and how reliance on a stakeholder steering committee making voluntary decisions is excellent in some situations, but not in others.

Huichica Creek is a small stream in southwest Napa County. There are 63 landowners in this rural watershed. A major shift from dairy farms to vineyards began in the 1980's and cattle left the upper third of the watershed. In the late 1980's, The Napa County Resource Conservation District began collaborating with the landowners of the watershed and various agencies to produce a watershed management plan.

The Huichica Creek Land Stewardship is a model watershed management program that gained widespread recognition for its effectiveness. The key approach here was not to use a standard, top-down, set of land management prescriptions developed by government agencies. Rather, agencies and landowners worked together to develop a plan that addressed both landowners' and natural resource conservation needs, and then to establish a set of techniques for landowners to use. The approach involves a "land ethic that approaches land and resource management by addressing all natural resources as a single interactive system which includes human activities as well as animal and plant communities."

"land ethic that approaches land and resource management by addressing all natural resources as a single interactive system"

Interest heightened in 1998, when the U.S. Fish and Wildlife Service listed the California freshwater shrimp (*Syncaris pacifica)* as an endangered species. This shrimp is only found in 17 streams of Napa, Sonoma and Marin counties, just north of the San Francisco Bay. It likes streams with underwater vegetation and tree-lined banks.

Threats to the shrimp included historic stream alteration, bank stabilization projects and tree removal along creeks, and predation by non-native fishes. Development of the Stewardship project changed the landowners' attitudes to this endangered species. Initially they viewed the listing as a threat, but then came to see the presence of the shrimp as a sign of a healthy, functioning ecosystem.

Participants in the Stewardship project developed a large number of solutions to an array of situations. One overall goal was to maintain wildlife corridors along the entire riparian zone of the stream and have woodland strips along parcel boundaries. The management focus for undeveloped areas was conservation and restoration of oak woodland and savannah, and re-establishment of native perennial grasslands.

For vineyards, key actions include planting native oaks and shrubs along drainage ditches and other water bodies, establishing riparian buffer zones along the waterways, adopting an array of sustainable agricultural techniques that reduce soil loss and pesticide use, and providing for some species of wildlife through nesting boxes and vineyard-edge vegetation. Some of the vineyards are on steep slopes, where halting erosion is key to sustainability.

For grazing land, the techniques include stock rotation with a goal of restoring the native perennial grasses, fencing off stream channels from cattle and protecting oak seedlings. The goal of restoring formerly grazed riparian areas is to re-establish gallery forests and understory shrubs - which would improve stream health and aid the freshwater shrimp.

Strategies for urban and residential areas include removing various non-point source water pollutants, dispersing stormwater runoff so that it adsorbs into the ground, and reforesting open areas with native trees.

Individual landowners developed their own conservation management plans using these techniques. In addition, there have been agency funded demonstration projects, including a vineyard site for riparian enhancement and wetland regeneration. Implementation actions have helped to improve water quality, the environmental health of the watershed, and agricultural operations.

Ventura County's Calleguas Creek watershed project, in contrast, became bogged down. The 220,000 acre watershed has over 400,000 people living in several growing cities, highly productive row crop farmland, rugged open space and 53 rare animal and plant species.

Heavy water pollution produces visible scars on fish, and 80,000 acres of urban development increases stormwater runoff. Soil erosion is running at seven times the natural rate and could eventually fill in Mugu Lagoon at the mouth of Calleguas Creek. The 1100 acre Mugu Lagoon is one of the largest relatively undisturbed saltwater marshes in southern California and is home to nine threatened or endangered species. There is a growing problem with salt contamination, much of it from urban waste-water.

A stakeholders' watershed group developed an ambitious set of goals - farmland preservation, protection of wildlife habitat, open space and economic health, reduction of erosion and of flood dangers, curbing water pollution and coordinating land use by several local governments. The group developed an array of possible solutions to these problems, that would have major impacts on the lives of watershed residents.

The Los Angeles Times' Gary Polakovic reported "the outcome could determine which crops are grown, how much people pay for sewer service and whether enough water is stored in aquifers as a hedge against drought. It could determine how often beaches are closed to swimming, which open spaces will be spared the bulldozer, even how well shampoo lathers during a morning shower."

Unfortunately, the watershed's different stakeholder groups focus on their own interests, rather than a holistic picture. State and federal legal requirements, major changes in the operation of local government, and visionary leadership by community and business leaders are probably necessary prerequisites to solving the problems of Calleguas Creek. [See following article on stormwater runoff.]

Lessons for Success

The U.S. Environmental Protection Agency has examined community watershed projects around the country and determined ten key principles for success. One of these is "build on small successes". The Huichica Creek Land Stewardship project made this possible with an array of easy to implement actions for local farmers. By contrast Calleguas Creek has set up a formidable array of goals that require large scale change. Huichica Creek also met the success principle of good leaders who empower others. Dennis Bowker, then Resource Conservationist for the Napa County Resource Conservation District, is an inspirational and very highly regarded champion of collaborative approaches and thinking out of the box.

Another EPA success principle involves the links between people and nature. "Too often in the past, environmental and economic and social issues have polarized people, making it impossible to achieve a common vision of sustainability. For the watershed approach to become a reality, there must be widespread recognition in the community that people and nature can coexist within the watershed. This can pave the way for partnerships of diverse interests to form around a sustainable vision." Additional EPA success principles encompass the need for a coordinator, education and implementation.

Watershed management is here to stay, has a major impact in many areas, and provides lessons on integrating issues for effective planning. Voluntary collaborative watershed processes can be a great success but are probably not the solution in all cases, especially in larger watersheds with multiple major problems and with many urban watersheds.

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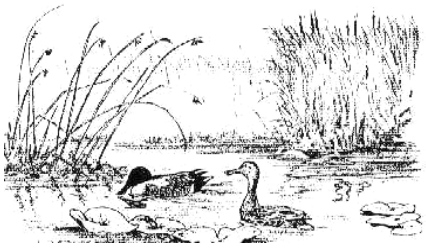


PLANNING FOR QUALITY OF LIFE

California's Growth & Air Quality Challenge

Air pollution control districts in California face a nearly insurmountable problem. We are required to provide clean air for everyone. Ground level ozone or smog from both stationary and mobile sources is our most pervasive air pollution problem. But pollution control district authority is limited to controlling stationary sources of pollution ranging from gas stations to power plants. Some districts in more polluted regions are needing to control even the solvent content of house paint and gaseous emissions from hot water heaters.

But unfortunately, while the air regulators are controlling and cleaning up numerous sources to meet the health based clean air standards, city and county populations are growing.

California is the nation's acknowledged leader in cleaning up motor vehicles, and the fuels that power them. But we are driving our vehicles more than ever before. In fact, the growth in vehicle miles traveled (VMT) far exceeds our growth in population.

To further complicate pollution problems, the sales of larger and more polluting vehicles like sport utility vehicles and light duty trucks now exceed the sales of more fuel efficient cars. Thus smog and energy consumption are growing faster than the VMT rate alone would suggest.

A look at air quality planning in Ventura County helps illustrate the problem. Our planning began in 1977. The first air quality management plan showed we would reach our clean air goal. However, a closer look at stationary emissions sources found we had overlooked several important, though not obvious, sources.

The next planning cycle showed that we could clean up the air for a while, but emission increases caused by population growth with the attendant increase in VMT, would soon overtake the gains made from our controls on stationary emission sources.

Our failure to find sufficient controls to overtake ozone increases brought by growth continued through all our planning cycles until 1995 when we finally found enough controls to overtake growth through our attainment deadline of 2005.

We have not yet calculated when growth will once again overtake our controls, but unless more is done to control stationary and mobile sources beyond what is in our plan, emission increases from growth will certainly cause us to once again fail to meet the clean air standards.

Our clean air future lies with decisions made by the cities and the counties about how they will accomodate growth. As population increases, emissions will increase.

Smart growth, growth that brings housing and jobs together, fosters the use of public transit, and mixes densities and uses, can extend the day of reckoning when air quality once again takes a turn for the worse. Will the cities and counties choose "smart growth", cleaner air, and better health for all of California's residents or will it be business as usual?

Smog control is a zero sum game. Controls on stationary sources cost local businesses money, sometimes a lot of money, while mobile emission sources continue to grow, keeping the goal of clean, healthy air for everyone unreachable. I believe growing smarter is the better way, the only way to go.

Richard H. Baldwin
Air Pollution Control Officer
Ventura County Air Pollution Control District

MANAGING STORMWATER RUNOFF IN URBAN WATERSHEDS

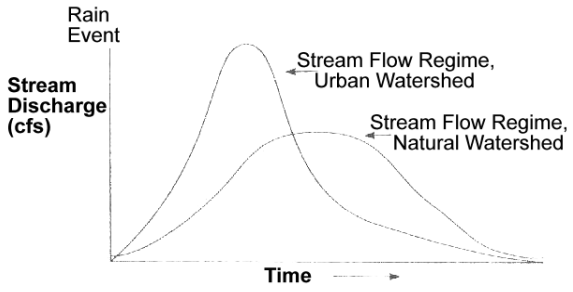
Urban development creates impervious surfaces, such as roads, parking lots and buildings. The resulting unoff during rainstorms or snowmelt flows into stormdrain systems and then into local streams, rivers or the ocean. This increase in runoff relative to undeveloped land can be very substantial.

Aquatic ecosystems begin to degrade when 10 percent of a watershed's land surface is impervious. A subdivision of large, 1 to 2 acre, lots has 10 percent impervious surface, while typical cities have far higher levels and downtowns can be virtually all impervious surface.

The standard engineering approach to this problem is to remove the water as quickly as possible, through a concrete stormdrain system. This solution increases the receiving streams' peak flows during a storm, and also speeds up the movement of water into and down the streams. The result is that streams flood much more frequently, regions downstream from the developed area have greater flood problems, and riparian vegetation is disturbed more frequently.

The figure below shows typical changes in a stream's hydrograph caused by urban development and the storm drain system. The traditional engineering solution to this stream flow problem is to channelize streams and build floodwalls or levees, destroying riparian and aquatic ecosystems in the process.

Storm Hydrograph



Source: U.S. Environmental Protection Agency

Now the day of reckoning is arriving for this standard approach to urban stormwater management. Since passage of the federal Clean Water Act, water quality has improved in many rivers and streams thanks to controls on point sources of pollution such as wastewater treatment plants and factories. Many waterways remain seriously polluted however, impacting fish and other aquatic life, reducing human uses, and causing serious ocean pollution in places like California's Santa Monica Bay and Chesapeake Bay on the U.S. Atlantic coast. These remaining problems center on overall land uses and how we manage water.

Stormwater runoff in metropolitan areas is a major pollution source. Los Angeles may have the worst runoff problems in the nation. For example, Huntington Beach in southern California was closed for most of the summer of 1999 because of bacterial pollution from runoff.

Stormwater drain systems typically run straight into streams or other water bodies, with no treatment systems. All the oil, metals and other pollutants on the roads, parking lots and roofs flow into the streams. In many areas of California, where there is no rain for five to seven months, the first fall rains create a major pollution spike as they wash off these impervious surfaces.

Changing Regulatory Framework

The 1972 federal Clean Water Act (CWA) focuses on technology solutions for point source pollution - such as municipal wastewater plants. It has produced tremendous improvements in treatment of point sources such as municipal waste water. Now nonpoint source pollution is the major source of water pollution in the U.S., most of it coming from urbanized and agricultural landscapes.

However the Act also contains sections about overall water quality. Section 303 requires states to prepare a list of water bodies that do not meet standards even with those technological fixes, and to develop a Total Maximum Daily Load (TMDL) system (see text box on page 8). A series of lawsuits around the nation have forced states to develop TMDL programs and to prepare individual TMDLs promptly. Meeting TMDL standards will require major changes throughout affected watersheds, including control of stormwater runoff.

In addition, CWA Section 319 requires states to develop nonpoint source control programs. Earlier this year, a federal judge ruled that the U.S. Environmental Protection Agency can quantify nonpoint source pollutants and set standards to limit pollution.

This year the federal government approved California's Nonpoint Source Pollution Control Program. The California plan requires development of 61 management measures (MMs) for control of nonpoint source pollution in various settings, including urban areas, farmland, forestry and wetland / riparian areas. The Regional Water Quality Control Boards will set TMDL's for 500-800 combinations of water bodies and specific pollutants, and will fully implement the MM's during the 15 year Plan lifetime (1998-2013).

The Plan has three 5 year time periods, running from

Total Maximum Daily Loads (TMDLs)

These are required under Section 303(d) of the federal Clean Water Act. States prepare TMDLs for all water bodies that do not meet federal water quality standards with control of point source pollution.

A TMDL determines the maximum amount of a given pollutant that can enter a particular water body per day without exceeding the federal water quality standard. Some of this amount is a background level from non-human activities, some is allocated to point source systems such as municipal treatment plants, the rest to nonpoint source pollution.

A TMDL is required for each pollutant and water body, so a given stream or river may have a number of TMDL's. In 1998, California had 1,380 pollutant / water bodies combinations involving over 500 water bodies.

A TMDL is more than a number. It is also an analysis of the types of sources of the pollutants, the extent of pollution control needed, a monitoring plan and an implementation system. It forms the basis for developing land management practices and restoration efforts needed to meet water quality standards.

Implementation of TMDLs rests on state water quality law, the Porter-Cologne Water Quality Control Act for California.

1998 to 2013. The first phase involves development of MM's and implementation activities for these measures in specific watersheds. If adequate progress is not made through self-determined cooperation by stakeholders, subsequent 5 year phases allow development of regulations to control non-point source pollution under the authority of the state's Porter-Cologne Water Quality Control Act, followed by effluent limitations and enforcement.

In the beginning of this year, the Los Angeles Regional Water Quality Control board ruled that major new developments in the Los Angeles Basin, including subdivisions with 10 or more homes, must address stormwater runoff. Each project is required to collect or filter the runoff from the first 3/4 inch rainfall in any 24 hours. The Regional Water Board estimates this will address 85 percent of the runoff from new developments. Techniques include use of detention ponds and some of the low impact development approaches outlined in the next section. There are similar requirements for Ventura County. We can expect this trend to continue in other parts of California.

Low Impact Development and Stormwater Management

Various best management practices reduce the abnormally high flood spike of the hydrograph on page 7 , using techniques such as detention basins. But these approaches still result in increased storm flows down local streams, compared to pre-development levels, and do not remove pollutants. They also do not make storm water available for groundwater recharge.

Low impact development (LIT) technology uses an entirely different approach to stormwater management. The focus becomes reducing the extent of impervious surfaces, increasing adsorption of runoff into the ground, and removing pollutants on site through various ground filtration systems. Site-specific approaches include analysis of the local hydrology and actions that mimic the pre-development site hydrology. The results of the LIT approach are both much less waterway pollution and reduction of peak flows in streams to pre-development levels.

Here are some of the key approaches used in LIT. For detailed information see *Low Impact Development Design Strategies : an Integrated Design Approach*, referenced below.

- Reduce the impervious surface by reducing road widths and acreage of parking lots

- Design the site to minimize additional runoff. For example, use of cluster development and other techniques will reduce runoff and pollution of streams. The Charleston Harbor Project in South Carolina found that a cluster project scenario gave a 30 percent reduction in runoff and a 70 percent reduction in nitrogen and phosphorus pollution.

- Direct the runoff from roads etc into a variety of structures. These include bioretention cells or rain gardens which have a shallow ponding area and a permeable soil mix suitable for growing native plants. Infiltration trenches store water in a gravel bed and allow its infiltration into the ground below or into an outflow pipe. Grassy swales provide space for runoff and wetland water purification. Other techniques such as rain barrels and cisterns with underground storage tanks allow capture of roof runoff for later use in landscape watering.

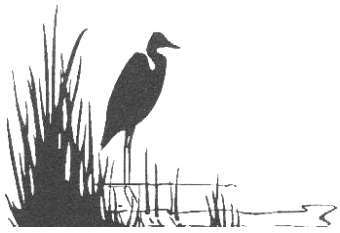
  These systems remove pollutants from the stormwater, increase its infiltration into the soil, so reducing the amount of water flowing into area streams, and increase the time it takes water to reach streams. The level of pollution treatment is variable, but often considerable. For example, filter strips remove 80 to 100 percent of lead contamination and anywhere from 20 to 100 percent of sediment. Vegetated swales, in contrast remove 20 to 50 percent of lead, and 30-65 percent of sediment.

- Any remaining runoff leaves the site in open channels with natural vegetation, not through concrete storm drains.

- Provide setbacks along streams, to protect them from nonpoint source pollution and allow for native riparian vegetation.

Conclusion

Control of nonpoint source pollution will be a major issue for years to come. The most effective approaches are not to try to create extremely expensive centralized control systems but to change land use practices and designs so as to curb runoff, remove pollutants, aid groundwater recharge, and allow for natural stream channels bordered by native vegetation. Low impact development techniques show how to achieve these goals for urban and suburban runoff.



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THE HIGH RISKS OF BUILDING IN CALIFORNIA'S FLOODPLAINS

It is easy to forget about flood risks during our long hot summers, years of normal winter rains or extended droughts. But various parts of California remain flood prone, and our traditional approaches are dangerously inadequate. Across the United States, flooding is by far the greatest disaster problem - much more so than earthquakes, or wind damage from hurricanes and tornadoes. Still our society refuses to grasp the basic realities of river behavior, the links between flooding and land use, and to carry out the essential land use reform.

The January 1997 floods in California's Central Valley were the latest wake up call. As geographer Jeffrey Mount explained in the Spring 1997 issue of *Linkages,* these floods gave us four key lessons.

- Levees and dams cannot eliminate flooding.
- California's multipurpose dams are for water supply, not flood control.
- Levees exacerbate damage from large floods.
- A cycle of serial engineering increases potential for flood damage.

Mount explained how society invites catastrophic floods. "By controlling the small and intermediate floods with levees, dams and a so-called 100-year floodplain, we have locked ourselves into a cycle of serial engineering of our rivers and floodplains. This cycle typically begins with the construction of levees in order to increase use of the floodplain for agriculture. Once established, these levees produce extended periods of tranquillity where once there was frequent nuisance flooding. This tranquillity, in turn, stimulates the initiation and growth of urban centers, virtually within the shadows of the levees."

"Superimposed on this is the Federal Emergency Management Agency (FEMA)-inspired 100-year floodplain, which encourages development up to some imaginary line in the sand. This line's accuracy does not, in any way, match the precision with which it is placed. The line represents a statistical best-guess based on a skimpy historical data base and a host of assumptions. The most it accomplishes is limiting development that would be inundated by small and intermediate floods. Worse yet, in most regions the levees have been raised to

a level to insure that the 100-floodplain lies just inside the levee tops."

Flood Control - Holland vs U.S.		
Rhine River	-	1,250 year flood
North Sea Coast	-	10,000 year flood
U.S. standard	-	100 year flood

Floodplain Development Continues

We are stuck with a number of urban areas lying in potential flood zones, including downtown Sacramento and Marysville. These existing urban developments are just too large to move.

But we can change future development patterns, by placing still undeveloped rural floodplains off limits to urbanization. So far society is unable to take this step. Even just after the disastrous 1997 floods, the idea of curbing floodplain development met strong resistance. In a January 1997 state legislature hearing, a lobbyist for the California Association of Realtors stated that his organization considered new limits on development in flood-prone areas to be repugnant.

Today, local government continues to allow, and even promote, development in areas like Sacramento's North Natomas where flood waters would be 20 feet deep in places, and on the Stewart Tract, a Delta island in San Joaquin County. Sutter County proposes a large industrial zone in flood-prone lands just north of the Sacramento County line. A single levee break will spell disaster. "California's Central Valley, one of the largest floodplains in America, is today a sizzling real estate market" wrote Sacramento Bee reporters Tom Knudson and Nancy Vogel in their 1997 Flood series. In addition, the flood danger on small streams in metropolitan areas is increasing because of upstream development that does not incorporate modern stormwater techniques (see previous article).
You can find the same problems in Arizona, Idaho and other western states. Over and over, decision makers pretend lands are no longer in floodplains because of the levees and the artificial "100 year flood" yardstick of the Federal Emergency Management Agency (FEMA.)

Planning for the Sacramento and San Joaquin River Basins

After the January 1997 floods in California's Central Valley, the U.S. Congress authorized an assessment of the flood damage and development of a comprehensive study of flood management on the Sacramento and San Joaquin river basins. The study also addresses restoration of riparian and wetland ecosystems along the river corridors, a critical feature since we have lost over 90 percent of the historic riparian woodland and of historic wetlands.

This is a federal and state interagency project, led by the US. Army Corps of Engineers and California's Department of Water Resources. It will involve a wide variety of stakeholders, including local governments, landowners, the agricultural industry and conservationists. The study focuses on the main stems of the two rivers, excluding the Delta. The lower San Joaquin River is a particular problem. It is now a highly constrained small river, quite incapable of carrying likely flows from the biggest storms.

To date, the comprehensive study has produced an interim report to Congress and hydrologic and hydraulic models, as well as initial stakeholder outreach. The models allow analysis of flood events as severe as a 500 year flood, including the impacts of lengthy storms centered over various parts of the system. They will permit examination of basin-wide impacts of adopting various policies, or making changes in specific locations. For example, how much will it help to change the operating procedures of a water supply storage reservoir, so that there is more room for flood water storage? How much will deliberate levee breakage at a floodwater impoundment site reduce the flood danger for downstream communities?

Other basics for the study include ecosystem function, analysis of levee failure potential, an inventory of riparian and wetland resources, and analysis of real world policy issues and constraints.

Stakeholders will look for multiple benefits. For example, levee setback along a particular river reach will allow for restoration of riparian vegetation and reduce the flood danger. In many areas, levee setbacks are compatible with seasonal agriculture, as currently occurs in the Sutter and Yolo by-passes of the Sacramento River. Stakeholder activities will include identifying initial projects, which agencies could carry out early on, as well as involvement in development of the overall flood management system.

The Institute for Ecological Health is one of the stakeholders in this Comprehensive Study. We would like to hear from readers with knowledge and ideas for specific reaches of the two rivers.

Inching Toward National Reform

A variety of flood control and land use experts are working to change traditional approaches to flooding. In 1994, the Galloway report on the 1993 Mississippi River flooding advocated restoring wetlands that act as sponges to hold floodwaters and moving low lying human communities. Wetlands restoration and community relocation have occurred in some spots along the Mississippi. But the meaningless FEMA 100 year floodplain system remains, gives a false sense of security, and encourages development of inappropriate places. It should be thrown out and replaced with a system based on very long-term flood possibilities and effective measures to prevent the building of new communities in floodplains. We must start making the link between flooding and land use planning.

Further Information

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Mount, JE. (1995) *California Rivers and Streams : the Conflict Between Fluvial Process and Land Use*. University of California Press.

Sacramento and San Joaquin River Basins Comprehensive Study. www.spk.usace.army.mil/civ/ssj/

WATER SUPPLY AND GROWTH

This year the California legislature again failed to act on a bill requiring certification of adequate water supplies before approval of large, new residential developments. Assemblywomen Kuehl's bill, AB1219, did not make it out of the Senate Agriculture and Water Committee.

Currently the specific requirement is just informational - that local governments obtain information from local water agencies before approving any development of 500 units or greater, and include this information in the project's environmental impact report. On the other hand, the courts are beginning to move in the direction that major developments have an adequate water supply.

Water for new development is a complex issue. The development community wishes to avoid additional controls. It argues against additional hurdles in the path of residential construction, citing the current housing shortage in California. But development without assured water is a recipe for future problems, and is often a mechanism for achieving unnecessarily sprawling development.

We see two issues here. One issue is where water for cities, suburbs and other built areas goes. A key component of the Smart Growth debate is that infrastructure expenditures should focus on existing developed areas, and not on promoting sprawl into rural areas. The focus of this discussion is on transportation funding. But society should apply the same approach to water supply. There should be a tight coupling between provision of additional water for development and avoidance of sprawl. This will be yet another way to encourage infill development, redevelopment and the best use of our existing cities and suburbs.

The second issue, which gets far more attention, is the total water supply. The water wars continue in California, as agriculture, cities and the environment compete for scarce water supplies.

A recent court ruling provides a new twist to this debate. In September of this year the Third District California Court of Appeal essentially agreed that State Water Project promises more than it can deliver, especially in Southern California. The court struck down part of the 1995 "Monterey Amendments." These closed door agreements on state water policy removed a requirement, established in 1960, that the state reduce water entitlements if it could not provide the 4.23 million acre feet annually originally envisioned for the State Water Project. The 1995 Amendments also put agriculture and cities on an equal footing in drought years, replacing the cities priority established in 1960. This ruling will intensify the ongoing debate on how to provide water for California.

NEEDS OF NATURE

The Importance of Large Rural Landscapes

One question that keeps cropping up is "why do we need large rural landscapes" in the private lands regions of California valleys and foothills in order to preserve Nature?

By large, we mean tracts of land ranging from tens to hundreds of thousands of acres with very few buildings. Much of the area may be a working landscape of farm and range land, but some may be formal wildlife preserves or public lands.

Why aren't a few small preserves, ranging perhaps from a couple of hundred to a couple of thousand acres and surrounded by a built environment, enough for Nature? Such small urban preserves are sometimes essential and play crucial roles. But the backbone of Nature conservation is the conservation of the large rural landscapes. Here are some of the reasons.

One basic tenet of conservation biology is that a wildlife area should be large enough to provide for the long term viability of all the native species in that area. For long-term, we should obviously think about hundreds of years, if sensitive species are to survive the current wave of human development. Habitat fragmentation, into smaller isolated parcels, increases the likelihood of local species extinctions over time. Recolonization after extinction and gene flow between populations is more difficult.

Scientists do not have the data to predict how large an area is needed for the long term viability of most species. Small species, such as a rare flowering plant, need relatively small areas, and certainly not tens of thousands of acres. But a number of larger species do need very extensive rural landscapes. For example, just maintaining the population of nesting pairs of Swainson's hawks in the farmland of the mid Central Valley in California requires several hundred thousand acres of suitable farmland, with strips of riparian forest along creeks. Achieving recovery of this species, listed as threatened under the California Endangered Species Act, will require a lot more land. Wintering ferruginous hawks require large areas of grasslands along the Central Valley edge.

Small birds also can need larger landscapes. For example, research on the Plains States prairies shows that different bird species utilize different local conditions, from almost bare ground, to lightly grazed areas, to tracts of shrubs. A large landscape is needed to provide all these conditions.

But Nature is far more than the sum of individual species. It is a variety of habitats and vegetative communities, with a great deal of structure and various ecological processes. For example, foothill landscapes in the Sierra Nevada and the Coast Ranges are a bewildering array of vegetative communities - sculptured by aspect (north, south etc), soil, microclimate and history. We need to conserve large landscapes with this full mosaic. Then there is the need to conserve significant natural areas along streams and rivers, including uplands as well as floodplains.

In addition, urban and suburban areas and roads have significant negative effects on the adjacent rural lands. Some of these edge effects are short range - such as microclimate effects on a woodland. Others have more distant impacts. For example, Dutch researchers found a highway with 50,000 vehicles a day has a negative impact on some nesting grassland birds for a distance over 800 meters from the road.

California's development patterns and planning laws tend to create habitat islands in a sea of urbanization, which will doom many species over time. Nature needs contiguous landscapes where the built environment forms the islands. To achieve this outcome we must plan wisely and conserve the remaining landscapes of natural and agricultural lands.

UC MERCED - A GROWING CONTROVERSY

In the early 1990's in the University of California (UC) decided to build a tenth campus. The siting process narrowed to focus on the San Joaquin Valley, a rapidly growing region with three state university campuses but no UC campus.

The initial siting review identified Fresno, complete with opportunities for urban revitalization, as the preferable site. However, UC regents chose a rural site next to Lake Yosemite, north of the city of Merced. Their selection was based partly on criteria of the UC system that land be undeveloped and the site donated to the university.

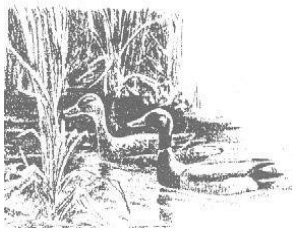
Use of this site will involve construction of both a campus and a new town, since it is several miles away from the existing city of Merced (even though it is close to the future northern boundary of the city). Planning for the Merced campus and university community site is well under way, with a goal of opening the campus in the fall of 2004. Both the UC leaders and governor Davis have a strong commitment to this 2004 opening.

However it has become more and more apparent that environmentally this site is an extremely unfortunate choice. Vocal opposition has appeared both within the UC academic community and from environmental organizations such as the Sierra Club and the California Native Plant Society. The project faces major hurdles in the regulatory review process, from both wetlands and endangered species perspectives.

Vernal Pool Grasslands

One of the most remarkable ecosystems in California is the vernal pool grassland. Here ephemeral pools, underlain by highly impermeable soils, fill up with water when the first winter rains arrive. As the rainy season ends in the spring the pools slowly dry up, often with spectacular displays of low-growing native wildflowers that form rings around the edges of the pools.

There are 69 plant species that are endemic to California's vernal pools, that is they occur nowhere else. The list of small invertebrates that live in these pools keeps growing as biologists discover and describe new species. Waterfowl use the pools in late winter, feeding on an important high protein diet before migrating northward to breed..



Major vernal pool grasslands occurred down the east side of the Central Valley, from Butte to Fresno counties. According to the U.S. Environmental Protection Agency, only 25 percent of the historic vernal pools remain, a large portion of the vernal pool grasslands having been converted to irrigated agriculture and, increasingly, to urban development. Most of the remaining pools are in fragmented and degraded habitats.

The UC Merced Site

Unfortunately, the University of California chose a site on the edge of the largest remaining intact vernal pool landscape in the state - a total of about 60,000 acres lying roughly east of the city of Merced and stretching from just north of Highway 140 to the Merced river. Not only is this the largest vernal pool landscape, it is also particularly rich in endangered and rare species and is considered the second most important area for wintering raptors in the state.

The overall UC Merced site encompasses 10,300 acres, of which about 2,000 acres are designated for the campus. The remaining acres will provide space for the new town, the university community. Ultimately, the university will have about 25,000 students, the university community about 30,000 residents.

If development does occur on this site, then the large majority of this 10,300 acre tract will remain undeveloped. The campus will use 1,000 acres or less of its 2,000 site. The university community will use about 2,000 additional acres, leaving about 7,000 acres undeveloped.

But severe environmental impacts are unavoidable, even with development of only a portion of the site, as it consists of a number of small watersheds, all originating in the campus area and possessing many vernal pools and endangered species.

Detailed environmental analysis since the initial site selection has shown the biological values are much greater than originally supposed. There are least 25 special status species on this site, only three of which were known to occur here when the University first selected this location.

Looking Ahead

The University and the County of Merced must obtain a variety of federal and state permits in order to build this project. They include a permit from the U.S. Army Corps

of Engineers, under section 404 of the federal Clean Water Act (CWA), for fill of vernal pools. This process includes consultation with the U.S. Fish and Wildlife Service and the U.S. Environmental Protection Agency. Under Section 404 of the CWA, project proponents must consider alternative sites and show their site is the least environmentally damaging practicable alternative.

At present, the University and the State seem totally committed to pursue the Lake Yosemite site, and to open UC Merced in the fall of 2004. There is the likelihood of a large amount of habitat conservation in the rest of the 60,000 plus acre vernal pool grassland landscape, under the leadership of The Nature Conservancy. The 2001 state budget provides $30 million for conservation in this landscape as habitat mitigation. There are also support groups providing a voice for this site.

The state needs an eleven UC campus, and the San Joaquin Valley will benefit greatly from a UC campus. However, project proponents are likely to be stymied in achieving the 2004 deadline for campus opening, given the major regulatory hurdles and likely legal battles. We have seen before how large, highly controversial projects in California become stalled for many years. Considering the very unusual ecological importance of the site, it makes more sense for the University to reconsider and to fast-track campus development elsewhere. Project opponents have suggested other options, including one much closer to Merced that already has a CWA permit. At the same time, conservation of the entire east Merced vernal pool grassland landscape can and should be a top priority.

As California enters another round of growth, conservation of remaining large natural landscapes becomes more and more vital for our long term ecological and economic health and social well-being. Also Smart Growth proponents from many backgrounds and interests realize that the time has come to curb urban sprawl and develop more compact human communities with a very high quality of life for all residents. We need the University of California to be a leader in the Smart Growth movement. This will require changes in the UC site selection criteria.

The Institute for Ecological Health does not take positions on individual projects, including the UC Merced proposal. But we see the obvious - University insistence on developing this site is a lose-lose situation. There are bound to be serious lawsuits by various groups, that will likely cause years of delay, unraveling the University's plans and impeding the important step of establishing a UC campus in the San Joaquin Valley. Local political, economic and civic groups will be frustrated by delay, as will state political interests. Conservation groups are better off focusing on a myriad of other issues, rather than a totally unnecessary action by the University. And the environment will be the loser. Rapid movement to another site would be a win-win situation for all these parties, and the environment. It is time for statesmanship by the University of California.

Further Information

The University of California provides information at the UC Merced Web site www.ucmerced.edu.

For a clearinghouse of information and articles on the UC Merced site, see www.vernalpools.org.

For information on the university community, see www.merceducp.org.

REVIEWS - LAND USE PLANNING AND MANAGEMENT IN CALIFORNIA

Guide to California Planning, second edition
William Fulton
Solano Press. (1999)

Transforming California : a Political History of Land Use and Development
Stephanie Pincetl
The Johns Hopkins University Press. (1999)

These two books provide very different and illuminating views of land use planning and related activities in California. Bill Fulton examines how local government's land use planning works in California today, while Stepahnie Pincetl brings us a political history of California land use since the gold rush, addressing urban development, agriculture, private land forestry and water. Both these books leave the reader with a strong sense that our current land use planning system is inadequate for addressing growth in the coming decades, but that the current system is firmly embedded in the California psyche.

Bill Fulton's second edition of his well known *Guide to California Planning* is both an extremely lucid explanation of the nuts and bolts of California land use planning law and a stimulating exploration of key current issues. It should be essential reading for everybody concerned about the future of the state. The nuts and bolts sections cover planning laws and their use by local governments, the California Environmental Quality Act

(CEQA), redevelopment law, and infrastructure.

There is also extensive consideration of property rights and the impact of Supreme Court decisions, of efforts to manage and control growth, development agreements, endangered species and other natural resource issues. He explores the various ways that the post-Proposition 13 climate has fiscalized land use, including a reliance of new development that encourages counties to promote suburban sprawl, and competition for sales tax dollars.

Fulton stresses that planning is politics and that state planning law, including general plan law and the environmental quality act, CEQA, set down a process for local governments but do not provide policy requirements that they must meet.

Furthermore, he points out that California planning law is based on enforcement by citizens rather than by state government, which makes interest group lawsuits inevitable. This leaves the reader pondering how much more effective local planning would be if there were substantive state policies and state oversight of local government action.

His overview of the various planning laws contains an array of insights into how planning functions, or does not function, in California. Over and over, it is clear that the system does not work well, from general plans that rarely contain a vision of a community's future, to county Councils of Government that oppose substantive regional government because their boards are composed of local elected officials.

One new direction stands out. Over the past few decades most growth has been at the urban fringe, and planning has focused on the resulting issues. But now we have very substantial urban and suburban areas, many with continuing internal population growth. Fulton sees 21st Century growth and planning focusing on existing developed areas - which brings in an array of redevelopment, revitalization and concerned neighbors issues - rather than the metropolitan fringe.

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Stephanie Pincetl's *Transforming California* shows us how the solutions currently promoted by advocates of regional planning, Smart Growth, and Livable Communities have been around for decades but reform efforts have always hit insurmountable political obstacles. This illuminating book paints a picture of a post 1850 California seeped with a drive to develop and grow, with a focus on building agricultural and industrial economic power and maximizing land development, rather than a focus on land stewardship and human quality of life.

Pincetl considers that the root of later 20th Century problems was political reform achieved by the Progressive Movement in the early part of the 20th Century. This was an era when the Southern Pacific railroad seemed to control California politics. The reforms, including the right for ballot initiatives, undercut the power of political parties and fostered the role of the individual politician, lobbyists and special interest groups. They also set up a system of regulatory boards and commissions comprised of members of the businesses being regulated. For example the Board of Forestry was comprised of timber industry members. The progressives expected such boards to promote the common good rather than business sector needs.

All through the 20th century there were attempts to reform planning efforts, from promotion of regionalism in land use planning, to provision of subsidized water only to small family farms and not to giant corporate farms. In the 1970s, California Tomorrow unveiled a regional government plan, while groups like People for Open Space (now the Greenbelt Alliance) campaigned for urban boundaries framed by secure greenbelts, in conjunction with compact city centered growth, and development that was transit oriented and with mixed uses.

The 1980's saw a barrage of local growth control initiatives that did little to manage the state's growth. The 1990's saw yet another round of growth management reform proposals at the legislative level, but these too died.. This story reinforces the sense that we know what to do to refashion growth, revitalize aging cities and curb sprawl, but we lack the political ability to act..

INFORMATION RESOURCES

National

Theory in Action: Smart Growth Case Studies
Association of Bay Area Governments, Oakland, CA (2000) www.abag.gov (510) 464-7900

This helpful booklet provides 55 examples of Smart Growth under various categories. Many are from California's San Francisco Bay Area, but there are examples from other areas and 26 are from other states. The examples cover planning processes as well as design and address compact communities, comprehensive policies, housing supply, land conservation and urban revitalization. Topics range from transit oriented development, to compact development policies, to regional planning for sprawl reduction, to inclusionary zoning, to affordable housing to farmland and open space conservation.

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Restoring North America's Birds: Lessons from Landscape Ecology. Robert A. Askins. Yale University Press (2000)

The author used his very extensive reading of the ornithological and landscape ecology literature to write an extremely readable book on factors influencing bird populations in nine ecoregions of the United States. Most of these regions are in the East and Midwest, but there are also birds of western mountain slopes and declining birds of southwestern floodplains. This book provides the current scientific understanding of the human impacts on bird populations. The final chapter applies general landscape ecology principles to bird conservation, providing recommendations on needed actions. This is a very timely book, given the increasing human impacts on natural and rural landscapes and the broad interest in birds.

California

Growth Within Bounds : Planning California Governance for the 21st Century
Report of the Commission on Local Governance for the 21st Century. (2000) www.CLG21.ca.gov (916) 322-9906

Many of our land use problems and the propensity of growing cities to sprawl across the landscape stem from defects in our local government system, particularly chronic underfinancing of local government and state land use law that mandates processes but not policies or goals. This prestigious commission recommends a series of strengthening to LAFCOs (see Linkages # 6) in order to prevent sprawl, stronger policies to protect farmland and open space, overhaul of local government financing, incentives for regional coordination, state-local coordination, and greater public participation**.**

Back Issues of *Linkages* Available

Most articles in each issue focus on a single topic. Spring 2000 considers the future of Rural Landscapes. *Grappling with Growth* (Spring and Fall 1998 and Spring 1999) is a set of three issues dealing with the problems and solutions of metropolitan sprawl & the need for livable communities. Previous issues address Conservation Planning (Fall 1997), Flood Management (Spring 1997), the Sierra Foothills (Fall 1996), and the Central Valley (Spring 1996.)

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