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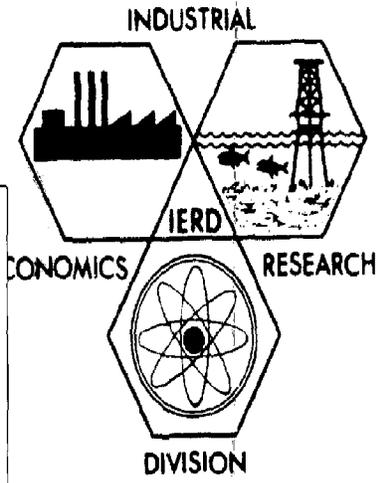
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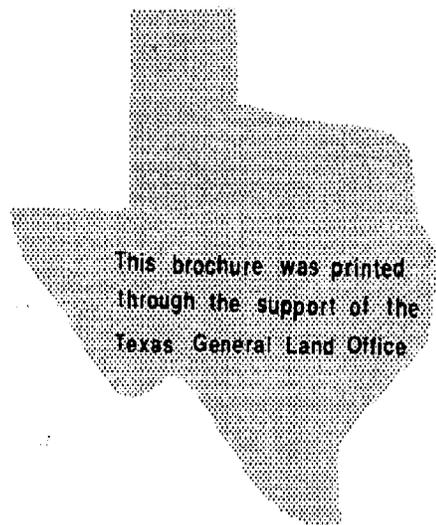
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LAND RESOURCE MANAGEMENT

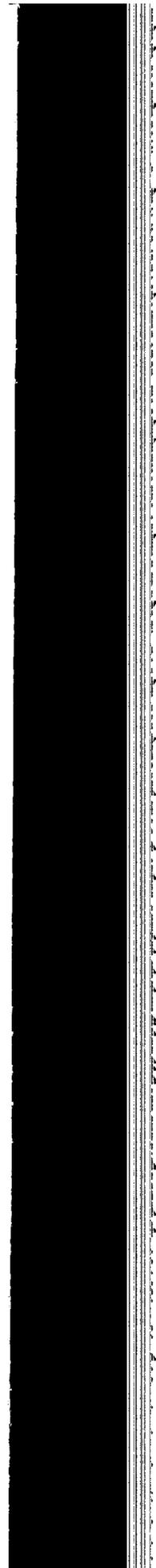
Guide for City Councils
Planning Commissions and
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LAND RESOURCE MANAGEMENT
A GUIDE FOR CITY COUNCILS
PLANNING COMMISSIONS AND COUNTY COMMISSIONERS

U. S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
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FOREWORD

This report is a summary of the land resource management aspects of a report entitled, A Pilot Project With the Nortex Regional Planning Commission to Study Land Resource Management Criteria in Texas.

The original report was supervised by the Texas General Land Office and was made possible by grants from the U. S. Office of Education, Title I, administered by the Director of Community Services, Coordinating Board, Texas College and University System, from the provisions of Section 701 of the Housing Act of 1954 as amended, allocated through the Nortex Regional Planning Commission, and from the Texas Engineering Experiment Station at Texas A&M University.

The printing of this summary report was financed by the Texas General Land Office and the Industrial Economics Research Division of the Texas Engineering Experiment Station at Texas A&M University in recognition of the critical need for an understanding of some of the principles involved in land resource management. This is especially true in view of pending Federal and State legislation regarding land use management.

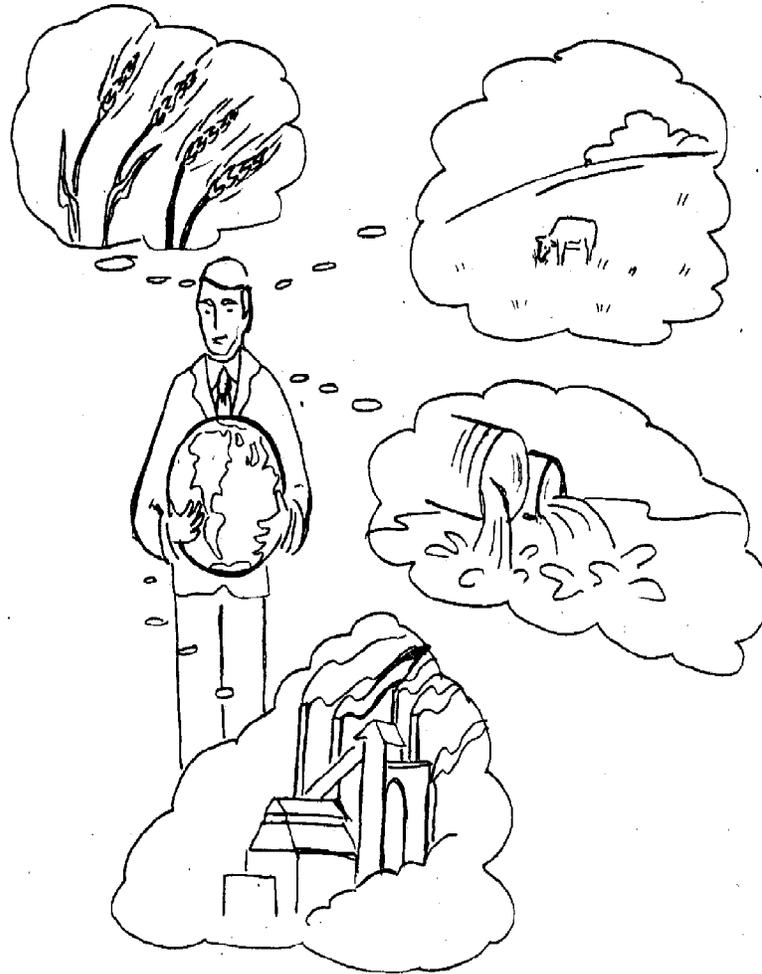
This report explains some of the principles of land resource management and then relates these principles to residential, commercial, industrial, recreational, and farming-ranching land uses. Following this, the roles of various units of government in land resource management are discussed. The report concludes with an application of these principles to a tract of land in Wichita County near Sheppard Air Force Base.

March, 1974
Perry J. Shepard, Head
Industrial Economics Research
Division

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LAND RESOURCE

MANAGEMENT

CONSIDERATIONS

There are many items which need to be considered in land resource management. Some of the chief items are atmosphere, soil, topography, hydrology, and vegetation.

ATMOSPHERE

Air can carry pollutants which could cause illness and shorten lives. Proposed developments, therefore, should consider the relationship of pollution to the prevailing wind patterns. Another consideration is noise levels. Certain noise levels could interrupt sleep and cause psychological irritation. Storm patterns can be studied in order that the necessary safeguards may be taken to prevent damage to buildings and landscapes.

SOIL

Soil may place certain limitations on construction. Some soils shrink and swell considerably due to moisture loss and gain causing building foundations and surfaced areas to break. Soils possessing a high level of corrosivity can cause underground pipes to corrode. Soils with a low rate of water penetration (percolation) are not satisfactory for septic sewage systems, while the supporting (bearing) capacity limits the size of buildings.

In addition to building precautions regarding soil, other areas of concern need to be considered. Erosion of soil can be caused by the removal of vegetative covering and/or tree rooting systems.

This is of special concern along river banks where the water can erode the bank causing landslides. Pesticides can pollute soil and enter food chains if they are not properly applied or biodegradable. In areas of high land subsidence (sinking ground) underground pipes and cables can break and surfaced areas crumble. Before an area is urbanized, it would be good planning to first extract any valuable mineral resources. Also, when considering extending an urban area, it may be remembered that while agricultural land can be readily converted to urban land, urban land cannot be easily returned to agricultural land.

TOPOGRAPHY

The slope of land sets certain limitations on its utilization. For instance, agricultural land with a slope over 18 percent will erode when cultivated, while a zero slope will result in poorly drained land. Commercial and industrial developments become costly if the slope is over five percent, while residential areas may have a slope up to 15 percent before costs escalate for roads, utility provisions, and erosion control.

HYDROLOGY

Recharge zones are those areas which most readily transmit rainfall from the surface to ground water reservoirs (aquifers). Care needs to be taken that these recharge zones do not encompass activities which could pollute the aquifers.

Building in flood plains is always risky. Some of the most attractive land near or in urban areas for development often lies in flood plains. Unfortunately, many homes located in flood plains are sold without properly conveying this information to the new owners. The existence of a flood plain may be determined by a number of different methods, such as, utilizing topographical maps and/or comprehensive plans, newspaper accounts of past flooding, recollections of residents in the area, checks of the area following a heavy rain, asking the city planner or the city engineer, and in the case of larger flood plains in a major river system by consulting the Army Corps of Engineers.

Drainage can also cause problems. Natural vegetation helps hold rain water, while paved surfaces provide added runoff. If too much water is diverted to drainage systems and not permitted to return to the ground, the water table will be lowered and trees will die.

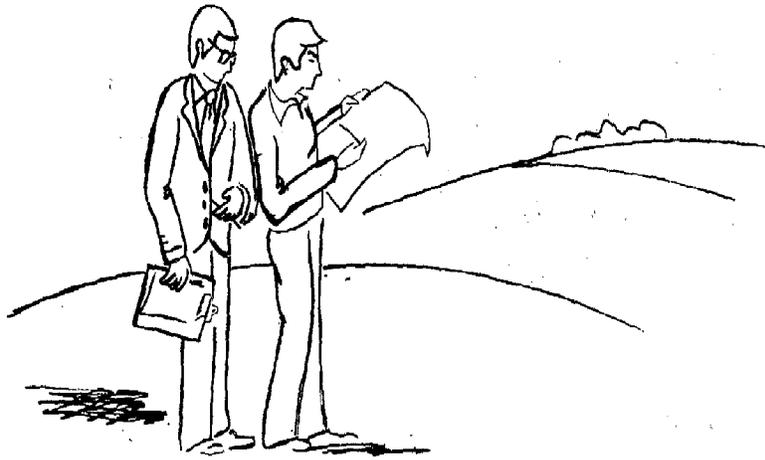
Surface water can become polluted in a number of different ways. Industry can pollute by discharging toxic substances, particularly chemicals, and by thermal discharges. A variation of a few degrees can upset breeding cycles and result in direct fish kills. Excessive discharge of sewage can utilize the oxygen in the water resulting in fish kills. Fertilizer run off stimulates aquatic plant growth which can lead to increased water treatment costs, loss of water oriented recreation, and clogged irrigation channels. Finally, surface

water can be polluted by rain falling through the atmosphere. About 40 percent of the particles in raindrops are man introduced.

VEGETATION

Wildlife is dependent upon vegetation. Before vegetation is removed, three things should be ascertained. Are any endangered species dependent upon this vegetation? Does it provide a necessary resting point for migrating wildlife? Does it serve as a vital connecting corridor for wildlife?

Vegetation and tree root systems play a vital role in preventing erosion, dust storms, and landslides. Trees and ground vegetation can also reduce the amount of pollutants in the air and serve as buffers for noise.



PRACTICAL LAND USE

CONSIDERATIONS REGARDING

DIFFERENT LAND USES

Various land uses require different conditions. Some of the more practical land-use considerations are listed for residential, commercial, industrial, recreational, and farming-ranching land uses.

CONDITIONS FOR RESIDENTIAL AREAS

ATMOSPHERE

- Air patterns should not add pollutants to area (check wind patterns, velocity, and distance from any polluting industry).
- Limit development in areas of high noise, i.e., airports.

SOIL

- Should possess low shrink-swell characteristics.
- Avoid building on uncompacted land fills, such as buried garbage areas (sanitary land fills).
- Percolation rate should be adequate for septic tank outflow (effluent) where there is no public sewer system.
- Any high shrink-swell area could be left in open space, or utilized in a Planned Unit Development where the high shrink-swell sections would not be used for building.
- Limit building in areas where valuable mineral resources are located.
- Any moderate to high corrosivity needs to be controlled by a small electric charge (cathodic protection), or plastic pipes should be utilized.

TOPOGRAPHY

- Variation in terrain is desirable.
- Slope should be under 15 percent.
- Check for any possible landslides which could be caused by sharp slopes.
- For septic field systems, there should be no more than a 10 percent slope.
- Avoid building over fault lines.

HYDROLOGY

- Well drained.
- Outside flood plains.
- Attempt to preserve natural drainageways by preventing their blockage through incorporating them into some open space pattern.
- Limited building over aquifers and recharge zones.
- Identify dangers that would result from increased runoff by the removal of vegetation.

VEGETATION

- Wildlife pathways and "resting points" should be identified and preserved.
- Some tree cover is desirable for shade, wildlife and wind-breaks.
- Shade trees are desirable for mobile home developments.
- Housing developments should be designed to save the maximum number of trees.
- Unique and economically important wildlife habitats should be preserved.

- Vegetation may help control noise, air pollution and erosion.

EXISTING DOCUMENTS

- Check any existing subdivision regulations, building and housing codes, and zoning regulations.
- Check any local and regional comprehensive plans for the areas.
- Check any deed restrictions.
- Check for the existence of any special purpose districts and what limitations these may impose.
- Check existing laws for the protection of endangered species of plants or animals.

OTHER CONSIDERATIONS

- Should be separated from industrial areas.
- High density developments need to be in close proximity to permanent open spaces, community shopping, and transit systems.
- Suitability for an integrated design should include local shopping, schools, churches, playgrounds, and park areas.

CONDITIONS FOR COMMERCIAL AREAS

ATMOSPHERE

- Check pollution which may be generated by traffic.

- Identify corridors of noise pollution and determine the effect on various establishments.

SOIL

- Capable of being graded without undue expense.
- Low shrink-swell.
- Good bearing capability.
- Limit development in areas of valuable mineral resources until the resources have been removed.

TOPOGRAPHY

- Not more than a five percent slope.
- Avoid building over fault lines.

HYDROLOGY

- Let water return to soil if possible (too much drainage by solid surfacing can lower water table and kill trees).
- Well drained.
- Outside flood plain.
- Attempt to preserve natural drainageways and prevent their blockage.
- Identify dangers that would result from increased runoff by the removal of vegetation.
- Limit development over aquifers and recharge zones.

VEGETATION

- If there are trees in the area, attempts should be made to incorporate them into the development.
- Protect wildlife pathways and "resting points."
- Natural areas enhance commercial areas and provide wildlife protection.
- Vegetation may help to control noise and air pollution.

EXISTING DOCUMENTS

- Check any existing comprehensive plan, building codes, and zoning regulations.
- Check any deed restrictions.
- Check any laws for the protection of endangered species of plants or animals.

OTHER CONSIDERATIONS

- Should be located near heavy traffic patterns.
- Needs adequate and accessible parking.

CONDITIONS FOR INDUSTRIAL AREAS

ATMOSPHERE

- Prevailing wind patterns should blow away from residential areas.
- The possibility of temperature inversion layers trapping noxious pollutants should be checked.
- Check on possible noise problems.

SOIL

- Low shrink-swell.
- High bearing capacity for heavy industry.
- Capable of being graded without undue expense.

TOPOGRAPHY

- Not more than a five percent slope.
- Avoid building over fault lines.

HYDROLOGY

- Let water return to soil if possible (too much drainage from area can lower water table and kill trees).
- Attempt to preserve natural drainageways and prevent their blockage.
- Well drained.
- Outside flood plain.
- Avoid any type pollution runoff which could pollute surface or ground water.
- Thermal effect of the use of any stream, lake, or river for cooling needs to be checked.
- Identify dangers that would result from increased runoff by the removal of vegetation.
- Limit development over aquifers and recharge areas.

VEGETATION

- Provide a green belt or open space area between industrial and residential areas.

- Any existing tree cover should be incorporated, if possible, into the development.
- Protect wildlife pathways and "resting points."
- Unique and economically important habitats should be preserved.
- Vegetation could help to control noise and air pollution.

EXISTING DOCUMENTS

- Check any existing comprehensive plans, building codes, and zoning regulations.
- Check any deed restrictions.
- Check any legal pollution standards.
- Check any laws for the protection of endangered species of plants and animals.

OTHER CONSIDERATIONS

- Direct access is needed to transportation facilities.
- Within easy commuting time of residential areas.
- Availability of necessary utilities.
- Compatibility with surrounding land uses and/or consideration of the use of a green belt area.

CONDITIONS FOR RECREATIONAL AREAS

ATMOSPHERE

- In high use exercise type areas (tennis courts, ball parks, etc.) the air pollution level should be low.
- Avoid areas of high noise pollution.

SOIL

- No particular qualities, but good percolation will keep area more usable following rains.
- Facilities that are without public utility systems need soils suitable for septic fields.

TOPOGRAPHY

- No slope limitations for large areas.
- About a five percent slope is possible for smaller areas.
- Unique scenic characteristics are advantageous.
- Avoid building over fault lines.

HYDROLOGY

- Can utilize flood plains.
- No drainage limitations for large areas.
- Might utilize natural drainage creeks for open space system.
- Some road construction near streams can cause pollution runoff into the streams and lakeshores.
- Private septic tanks and numerous powerboats can pollute lakes and rivers.
- Ponds can be stocked for fishing.

VEGETATION

- Stream banks need vegetation to prevent erosion.
- Where possible, live oak and other year round vegetation is best.
- Protect wildlife pathways and "resting points."
- Unique and economically important habitats should be preserved.

EXISTING DOCUMENTS

- Check any existing comprehensive plans.
- Check general recreation standards to determine need.
- Check any laws for the protection of endangered species of plants or animals.

OTHER CONSIDERATIONS

- Availability for use by residential communities either by mass transit, walking, or roads.

CONDITIONS FOR FARMING-RANCHING AREAS

ATMOSPHERE

- Trees may be used as windbreaks, especially where there is sufficient wind to blow soil.
- Determine the effect of noise or air pollution on crops and animals.

SOIL

- Determine soil capability through Soil Conservation Service classifications and the Agricultural Experiment Stations.
- Check records or persons living in the vicinity for past yields.

TOPOGRAPHY

- Erosion control is needed where there are steep slopes.

- Cultivated slopes should be under 18 percent and not completely flat.

HYDROLOGY

- Drainage of pesticides can pollute water.
- Check soil salt buildup in irrigated areas.
- To prevent soil surface runoff and reduce siltation in the receiving rivers, streams, or lakes, a buffer of permanent vegetation should be maintained between tilled areas and water.
- Confined animal feeding operations should be located so they do not pollute surface or subsurface water.

VEGETATION

- Consider wildlife corridors in cultivated areas.
- Consider tree windbreaks.
- Consider management techniques to increase the productivity of natural vegetation.
- Consider effect on wildlife due to elimination of vegetation.
- Protect wildlife pathways and "resting points."
- Unique and economically important habitats should be preserved.

EXISTING DOCUMENTS

- Check county and/or area soil maps together with their interpretations.
- Check Soil Conservation Service reports.

- Check on whether land is located in any special purpose districts and what obligations this may entail.
- Check any laws for the protection of endangered species of plants or animals.

OTHER CONSIDERATIONS

- Once agricultural land is converted to urban use, the process is difficult to reverse.
- Agricultural land maintained near urban areas provides a more aesthetically pleasing environment, provides some wildlife shelter, and makes local produce available to the consumer.
- May be combined with open space planning.



NATURAL RESOURCE

MANAGEMENT AND THE

ROLE OF GOVERNMENT

It is helpful not only to understand some of the processes and concerns involved in land resource management, but also to have some insight into the roles various units of government play in land resource management. These roles are shaped by existing legal mechanisms, agencies and organizations maintained by government units, and by the scope of each problem.

LEGAL ROLES

The legal mechanisms of various units of government which may be utilized for land resource management problems vary considerably.

MUNICIPALITIES

A municipality can utilize only those legal powers conferred upon it by the State. In Texas some of the chief legal mechanisms are zoning, subdivision regulation, and land-use restrictions placed in private property deeds.

Zoning permits cities to establish land-use districts such as residential, commercial, and industrial areas. This is done under the police power of a municipality. The standards for invoking police power are normally legitimate goals, reasonable means, and that the reasonable means be rationally adapted to achieve the goals. In zoning, the goals are to lessen street congestion, secure safety from fire and panic, provide adequate light and air, avoidance of large concentrations of population, and the better provision of city

services. The United States Supreme Court declared these to be legitimate goals for which a city could restrict the usage of privately owned land.

Zoning regulations by court rulings and legislative measures must contain the following safeguards:

1. Regulations for each class and kind of building must be uniform within a zoning district.
2. There must be a reasonable basis for classifying areas differently based on comprehensive planning.
3. A zoning ordinance must cover the entire jurisdictional area of a city.
4. Zoning regulations must be reasonably applied.
5. Zoning is not a retroactive device, but a guide for future developments. Although a city may not require existing "nonconforming uses" be terminated upon passage of a zoning ordinance, they may require "nonconforming uses" be eliminated after the landowner has sufficient time to amortize the investment he has in his "nonconforming use" property.

Subdivision regulations are needed to ensure the orderly development of municipalities. The health department is concerned about safe water, sewage disposal, and proper drainage of new areas. The tax office views subdivisions as the first step toward the recording of land titles for subsequent taxation. The engineering department is concerned with the

construction of new streets, utilities, and drainage systems. The fire department is concerned about water availability and the streets the trucks must use. And, finally, school and park officials need to reserve land to serve people who will be living in these subdivisions.

Cities and towns may extend their subdivision ordinances into extraterritorial areas by adopting specific ordinances to that effect. Extraterritorial jurisdiction in Texas is governed by population class:

<u>POPULATION CLASS</u>	<u>EXTRATERRITORIAL LIMITS IN MILES</u>
0 - 4,999	.5
5,000 - 24,999	1.0
25,000 - 49,999	2.0
50,000 - 99,999	3.5
100,000 +	5.0

Private deed restrictions are based on the law of private contract and not governmental power. As such, there is no "health, safety and welfare" or "reasonableness" limitations placed upon deed restrictions. The theory behind deed restrictions is that lot owners agree to deed restrictions when they buy and the courts merely enforce that agreement as a contract. Restrictions can run for 50 years with renewal clauses. In law these deed restrictions are called "covenants running with the land" or "negative easements" and affect the land even if the owner is unaware of the deed restrictions

when he purchases the property. In 1965 the State authorized Houston to use its tax supported legal department to sue deed restriction violators.

Some of the other legal means a municipality may use to manage its land resources are taxation policies, annexation, building and housing codes, policies for extending municipal services, capital improvement programs, school expansion policies, and its flood plain management powers.

COUNTIES

The county as the municipality is a child of the State and all of its powers are conferred by the State. Counties have limited power to manage subdivisions established outside the extraterritorial jurisdiction of municipalities by forbidding the county clerk from recording plats of unincorporated lands without the prior approval of the commissioners court. In unincorporated areas, they also have flood plain management powers, authorization to maintain and operate parks, and the right to license public waste disposal facilities (and private sewage facilities where there is a pollution problem).

COUNCILS OF GOVERNMENTS

Regional councils of governments are also creations of the State and are required to review and comment upon many applications for State and Federal funds. By this means they can coordinate planning efforts in their area.

STATE

The Tenth Amendment of the U. S. Constitution reserves to the states all powers not delegated to the Federal Government nor prohibited to the states. The states' residual powers are limited by the Fourteenth Amendment which denies any state the right to deprive persons of property without due process of the law or to deny equal protection under the law. In addition to powers delegated by the State to local, county, and regional bodies, Texas has a number of other means of land resource management. Texas retained title to its public lands upon entering the Union in 1845. The State also owns the submerged bay land and islands with the exception of small amounts sold to navigation districts. Both the management of the public lands and their mineral interest are handled by the General Land Office.

Texas has passed public beach laws which ensure public access to State-owned beaches on the seaward side of the Gulf of Mexico. Generally, this is interpreted to mean the beach area extending from the water to the vegetation line. The State also requires that, with few exceptions, no outdoor advertising and automobile junkyards be established or maintained within certain distances of interstate and primary highways in Texas.

FEDERAL

The Federal government influences land resource management primarily through its spending policies.

This may be seen in some of the recent acts passed by the Federal Government. The National Environmental Policy Act of 1969 requires environmental impact statements for all proposed projects requiring Federal aid. The Rural Development Act of 1972 provides loans and grants to acquire and develop land for rural industrialization, water and waste disposal systems, and conservation related activities. The Federal Water Pollution Control Act Amendments of 1972 set strict limits upon water pollution. Industries discharging pollutants into the nation's waters must have the "best practical" control technology by July 1, 1977, the best available by July 1, 1983, and no discharge of pollutants by 1985. The Coastal Zone Management Act of 1972 provides grants for developing comprehensive coastal zone management programs and administrative grants to assist the states in implementation programs.

AGENCY AND ORGANIZATIONAL ROLES

The roles governmental units fulfill in land resource management are also determined by the agencies and/or organizations a particular unit of government maintains to assist with land resource management problems.

MUNICIPALITIES

Although a city council passes ordinances to establish building codes, housing codes, subdivision regulations, and zoning, there are three other

groups directly involved in land resource management. The city planning commission makes recommendations to the city council concerning present and future land use and is statutorily assigned the duty of approving subdivision plots. A city planning department assists the planning commission, mayor or city manager, and the city council in all areas where professional planning studies and/or consultation is needed. Finally, if a city has a zoning ordinance, a zoning board of adjustment attempts to interpret disputed sections of the ordinance.

COUNTIES

At the county level the commissioners court functions in the area of land resource management through approving certain subdivisions, establishing parks, licensing some waste disposal facilities, and in flood plain control, while the county clerk's office is important for filing deeds and subdivision plats.

COUNCILS OF GOVERNMENTS

A regional Council of Governments serves as a coordinator of the various types of planning taking place in its region. This coordination involves such items as Resource Conservation and Development Projects which are locally initiated to provide for natural resource planning, conservation, and development in contiguous counties with similar social, economic, and natural resource problems.

STATE

The Interagency Council on Natural Resources and the Environment works with State-level planning related to land use. The member agencies and their land use functions are:

- The Texas Department of Agriculture deals with service programs related to agriculture and the enforcement of agricultural laws.
- The Texas Air Control Board works in the area of air pollution control and abatement.
- The Bureau of Economic Geology of the University of Texas is responsible for the State geological survey.
- The Texas Forest Service offers management and service assistance for private forest lands.
- The General Land Office is in charge of managing the public lands and is the designated State agency to implement planning for the Coastal Zone Management Act.
- The State Highway Department does highway planning and construction.
- The Texas Industrial Commission promotes and plans industrial development for the State.
- The Texas Parks and Wildlife Department conducts park planning and development along with wildlife research and management.
- The Railroad Commission promotes oil and gas conservation and regulates oil field waste and water pollution control.

- The State Soil and Water Conservation Board is concerned with watershed protection and flood prevention. It also supervises the conservation districts.
- The Texas Water Development Board is active in water resource planning and development.
- The Texas Water Quality Board works in the area of water quality planning and control and with the regulation of industrial solid waste disposal.
- The Texas Water Rights Commission regulates the use of public waters.

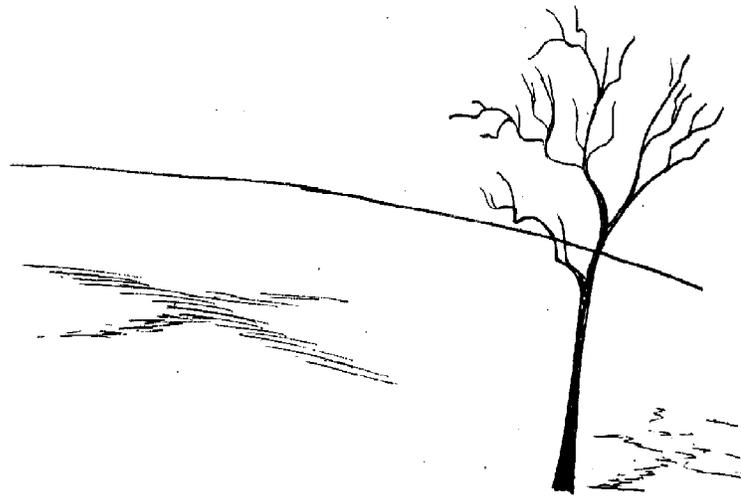
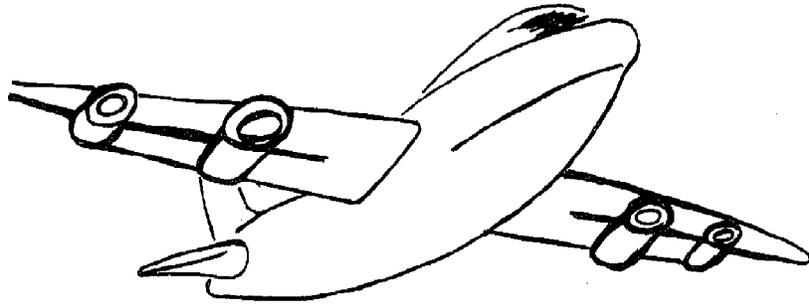
FEDERAL

On the Federal level there are several agencies specially concerned with land resource management. The Army Corps of Engineers provides for the planning, development, and management of water and related land resources in the nation's major river basins. Responsibilities of the Department of the Interior include helping manage, conserve, and develop the nation's water, energy, minerals, timber, forage, fish and wildlife, and outdoor recreation resources. The Environmental Protection Agency's task is to reduce pollution related to water, air, radiation, pesticides, and solid wastes.

ROLES RELATED TO THE SCOPE OF PROBLEMS

The role of a unit of government in relation to problems involved in land resource management is determined to some extent by the scope of the

problem. A problem may be classified as local if it is in an area covered by a city's comprehensive or general plan; as county if it lies within the county and is outside the areas controlled by municipalities; as regional if the problem involves planning coordination; as State if the problem requires legal powers either delegated to other governmental bodies or enacted by the State, and/or needs State appropriations; and as Federal if it cannot be handled by the State alone. An example of the Federal scope may be air and water pollution. Although all units of government are concerned about pollution, the primary scope of the problems generated by these pollutants is Federal since they move freely over State boundaries.



A CASE STUDY

An example of what can be done by utilizing some general ideas involved in land resource management is illustrated by a study of a 320 acre tract of undeveloped land in Wichita County in the vicinity of Sheppard Air Force Base.

Because of the proximity of the Sheppard Air Force Base, the area at times experiences deafening noise. This limits the development to uses other than residential.

Several other considerations limit development. Although the soil is well suited for agriculture, about 50 percent has zero slope and, therefore, limited drainage. The ground water is slightly saline to saline which permits only limited usage. Assistance in assessing the problems posed by the ground water could be obtained from the Texas Water Development Board and the Texas Water Quality Board. There are indications of mineral resources in either this tract of land or land immediately adjacent to it, including gypsum, sand, gravel, and oil. Attempts should be made to extract these resources prior to any development.

The Texas Organization for Endangered Species lists the Loring Kangaroo Rat, a native of this area, as an endangered species. Future developments in this area should be assessed for possible effects on this endangered specie.

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