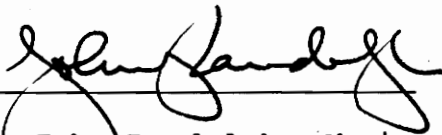


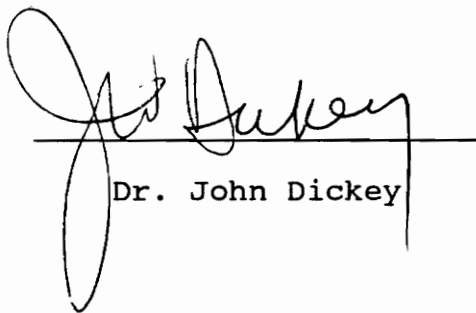
A CONCEPT DATABASE FOR ENVIRONMENTAL PLANNING

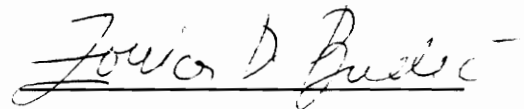
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Chapter I. INTRODUCTION

The purpose of this paper is to develop a database, named ENVIR, as part of the environmental decision support system (EDSS). An EDSS is designed to help environmental planners in solving problems that are poorly or insufficiently structured, as is often the case in environmental situations (Guariso & Werthner, 1989).

Databases are the fundamental component of an EDSS and can have different subjects and different formats. The database developed in this paper is narrative. It is mainly a collection of best management practices (BMPs) and rudimental principles in environmental planning and management area. (The term "best management practices" was originally defined as a practice or combination of practices, that is determined by a State (or designated area wide planning agency) to be the most effective practical means of preventing or reducing the amount of pollution generated by nonpoint sources to level compatible with water quality goals (Baldwin, 1985). In this study, "best management practices" is referred to as practicable and innovative measures which have been demonstrated by past operations to be effective in the improvement of environmental planning and management.)

The usefulness of the ENVIR database resides in the fact that much of what a decision maker does is based on previous experience -- both of his or hers and of other decision makers'. Analogies to previous, similar problems and their solutions help people in solving new problems.

Environmental planning covers a wide range of concerns having to do, generally, with minimizing the damage that human activity does to the natural environment (Baldwin, 1985). The goals may pertain to any of the following:

- * Minimizing threats to human health and safety, for example, by pollution control.
- * Preserving resources for future use, for example, soil erosion control.
- * Achieving aesthetic and recreational goals, for example, by landscape management.
- * Minimizing damage to the environment for its own sake, for example, wildlife protection.

In a word, the purpose of environmental planning is to protect our environment by employing proper land use policies,

carrying out pollution control projects, facilitating conservation programs, etc (Edington, 1977).

Chapter II. THEORETICAL BASES

II.1. Decision Support System (DSS)

A decision support system (DSS) is an interactive computer-based system that helps decision makers and planners to utilize data and models in the solution of unstructured problems. Computer-based systems that support planning are often referred to as decision support systems. A problem may be unstructured because of lack of data or knowledge, unknown context, unquantified variables, or too great complexity. Such problems can be resolved by the human in a man-machine system. The typical models in DSS include such database management system functions as data queries and data manipulation (Guariso & Werthner, 1989).

A decision-making process is composed of the following consecutive phases (see Figure 1):

- [1] Intelligence: This phase has to do with the search in the decision context, i.e. looking up necessary data, identifying the problem domain and structure.
- [2] Design: Different possible solutions of the problem are to be created and analyzed.

[3] Choice: The selection of a plan from the set of possible alternatives is performed.

[4] Implementation: This phase deals with the execution of a selected plan (Duncan, 1973).

Adequate and complete knowledge and information (or data) play a most important role in any decision-making process. A good decision is always based on good information. Therefore, a database management system (DBMS) is a very important component of the decision support system (DSS) and supports the intelligence phase very well. Either the design, or the choice, or the implementation phase is supported by the intelligence phase, of which DBMS is the heart. Actually, most applications of DSS are highly data intensive.

The decision making process is illustrated in Figure 1.

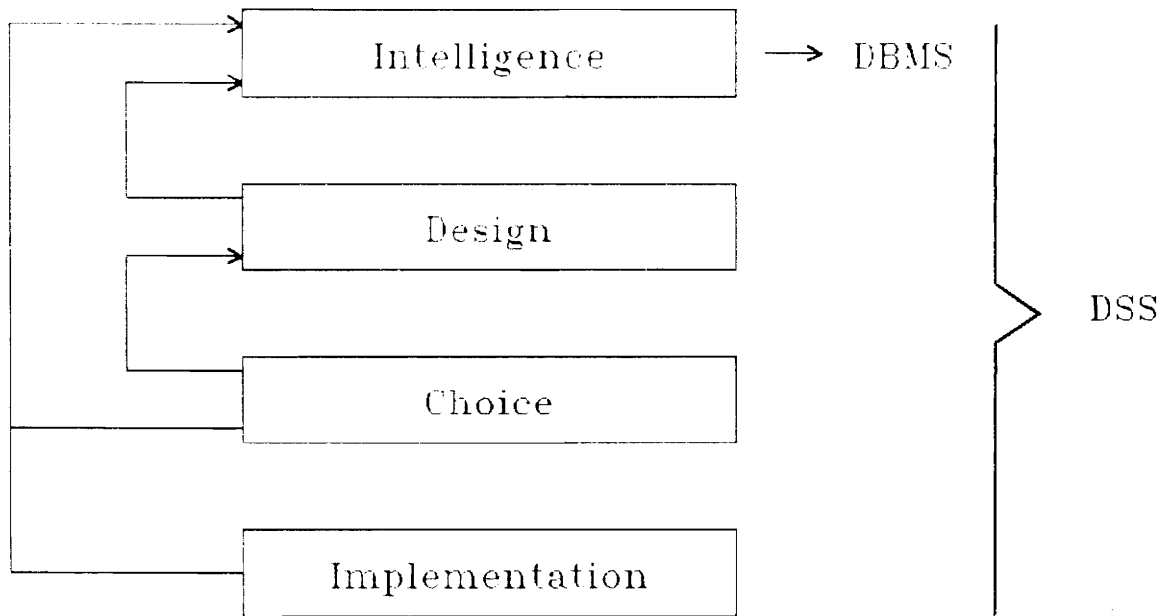


Figure 1. Phases of the decision making process.

(Guariso & Werthner, 1989)

A conceptual architecture of DSS is illustrated in Figure 2.

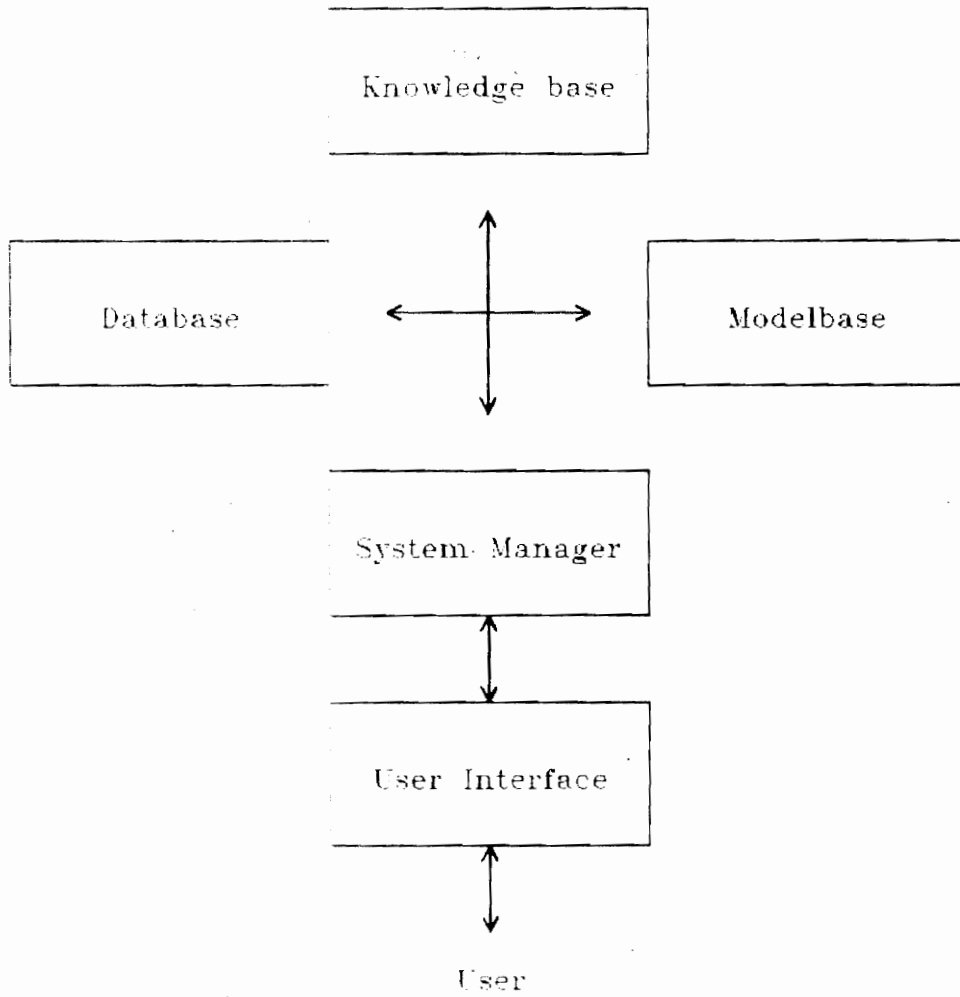


Figure 2. Decision Support System (DSS).

(Guariso & Werthner, 1989)

In the DSS architecture, the Knowledge base is the central memory of the system and contains knowledge about the problem domains. The Database may serve as an integration tool for the whole system, owing to not only its capacity to store data but also its well-developed database management system functions. The content of the Modelbase can be seen as the procedural representation of knowledge. The system manager has mainly control purposes, i.e. to make sure the storage of data, models, and knowledge are not mixed up with the dynamics of their use. The User interface offers to the decision maker, through the commands, instructions, or actions, the possibility to express himself or herself to the system and react to specific situations (Guariso & Werthner, 1989).

A database management system (DBMS) has a very important role in a DSS. It supports the central maintenance and integral management of data. The user of DSS is facilitated by conducting database queries through an interface. The DBMS also serves as an interface to external data sources from which data extraction can be performed through the DBMS.

II.2. Environmental Decision Support System (EDSS)

An environmental decision support system (EDSS) is a computer system to help decision makers in environmental

agencies and organizations. An EDSS provides a combination of several tools (as illustrated in Figure 3) necessary to support the process of structuring a problem, gaining new insights, looking for examples of problems that have already been solved, producing alternative solutions, and evaluating them (Guariso & Werthner, 1989).

An EDSS also fits nicely into the general framework of DSS presented in Figure 2.

The EDSS architecture is illustrated in Figure 3.

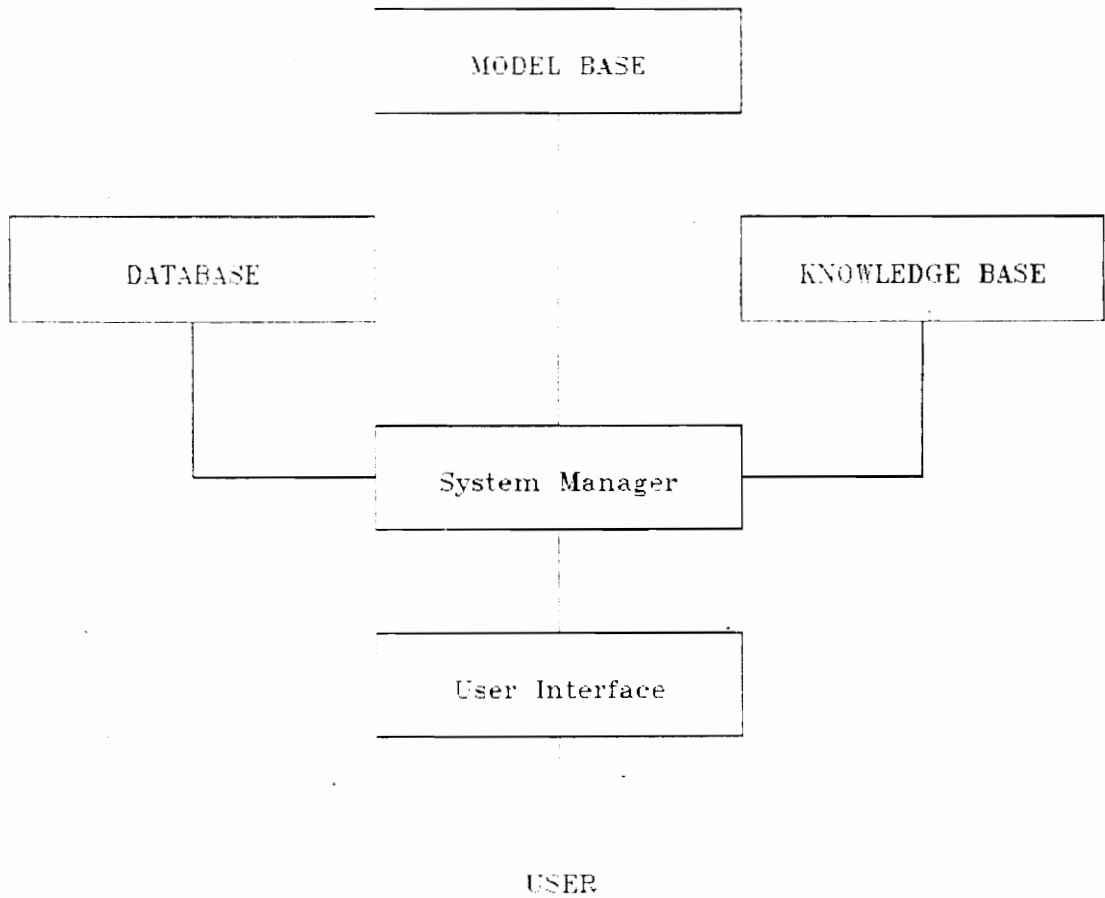


Figure 3. Environmental Decision Support System

(Guariso & Werthner, 1989)

In an EDSS, the Database should be designed in order to perform in a good manner when being searched by the user of EDSS. The Modelbase should contain large set of models of environmental systems. The Knowledge base should provide all the necessary information for handling models and data. The System Manager should provide the necessary coordination between the various bases. Finally, the User Interface is a Dialogue module which must be designed so as to make the whole system easy to be used interactively by even non-experienced users (Guariso & Werthner, 1989).

The EDSS may help the decision maker in many activities of environmental planning, such as testing different alternatives, showing their drawbacks, reviewing past experience, and suggesting choices. The EDSS may supply most of the information needed for a more conscious decision on many environmental problems.

II.3. Database Management System (DBMS)

A database management system (DBMS) is a software system by which to store and retrieve data (Lyon, 1976). The main advantages of a DBMS are:

[1] Data redundancy is reduced because all users of a

particular item of data can get a copy from the same record in storage.

- [2] In the DBMS approach, the way in which data is physically stored in the computer system is independent of the way in which it is referred to in application programs.
- [3] The file definition, editing, and validity checking can all be handled within the DBMS.
- [4] The DBMS includes query and report writing modules for the nonprogrammer, thus the planner can get the data needed from the computerized database without relying on a professional programmer.
- [5] The user (the planner or decision maker) can efficiently access the database directly using the query system whenever a specific data item in the database is required on an ad hoc basis (Murdick, 1975).

DBMS is important for building an EDSS in two ways:

First, databases and DBMS are an important prerequisite to an EDSS because building an EDSS without existing data bases and associated DBMS will be extremely difficult

(Sparague & Carlson, 1982). If the appropriate data base and DBMS (which provides for the maintenance and control of the data base) exist prior to use of an EDSS, the costs of installing the EDSS will be reduced, and the user of the EDSS will spend less time performing data base management tasks rather than decision-making tasks. A DBMS is also useful in deciding what data to use in the EDSS so as to reduce data redundancy.

Second, DBMS is one of the major components of an EDSS (as illustrated in Figure 3) because of the diversity of data that is required for decision-making (Sparague & Carlson, 1982). A poor DBMS component can cause the failure of an EDSS.

A DBMS produces data that has informational value by extracting it from a large collection of data according to some criteria given by the decision maker (Horton, 1982). Extracting may involve retrieval, sorting, merging, transforming, and summarizing. The extracting task is defined and triggered by a request generated by a planning activity.

II.4. Database

A database is simply a collection of information or data. Whenever one accesses a database, whether it be to add new

information, get information, change information, or sort the information into some meaningful order, one is managing the database (Brail, 1987).

A database is composed of many data items (also called data fields) which are of the same structure. Users of a DBMS cannot ask the system to store or retrieve anything smaller than a data item. A data item (field) may be a single number, word or other character or it may be composed of many numbers, words, and/or other characters (Stewart, 1989).

Data items are facts about entities. One entity often has many attributes or facts about it that the user would like to know about at certain time. Records are groups of data items that concern a certain kind of entity. For example, a concept can be an entity and can have three attributes: a title, a description, and a subject. One record includes these attributes of one concept (entity) (Brail, 1987).

The output function of a DBMS provides data to its users when requested and in the form requested. The data input operations are of critical importance to the entire system. Control over the quality of data entered into the system is essential for the integrity of the database. A properly designed data input procedure minimizes the amount of input

data required and thus minimizes the number of errors. A DBMS also contains programs to check each data item occurrence, which can be activated whenever a request to add or modify a particular data item is received.

The integrity and security of the database are important management concerns and require control over access to the data. A common type of access control system is "password" (Simpson, 1989).

II.5. ENVIR Database

The database developed in this paper, named ENVIR, consists of four hundred concepts, each of which is a description of a best management practice (BMP) or a rudimental principle in the environmental planning and management area. The basic idea behind this database is that past experiences play an important role in decision making and problem solving (Kolodner & Riesbeck, 1986). Since environmental planning requires data on actual past operations and experiences and an EDSS database should contain a database which collects such information.

First, experience contributes to refinement and modification of reasoning processes (Kolodner & Riesbeck,

1986). Successful experiences reinforce already known rules or previous hypotheses and give rise to the modification of faulty knowledge or hypotheses.

Second, individual experiences act as exemplars upon which to base later decisions (Kolodner & Riesbeck, 1986). Analogies to previous cases guide and focus subsequent decision making.

The ENVIR database built within "Paradox" (a powerful DBMS) is expected to provide environmental planners the capacity to retrieve relevant past experiences and apply them to new situations in order to solve new problems.

II.6. Summary

A database is a subsystem of a decision support system and should aid planners and decision makers in formulating plan alternatives. A data management system can provide quick access to the many historical facts and parameters that can be useful. A database containing data on actual past operations or experiences can help generate new ideas and support decision making. Planning and design of environmental protection programs can benefit from access to reports showing how similar projects were operated in the past.

The ENVIR database is developed as part of the environmental decision support system and can assist environmental planners in solving various problems by providing diverse information on previous operations and experiences.

Chapter III. METHODOLOGY

Three tools were utilized to achieve the goal of this paper (to develop a database as part of an environmental decision support system (EDSS)): literature survey, "Paradox"(a database management system), and "CyberQuest"(an innovation support system developed by Dr. John Dickey at Virginia Tech).

III.1. Literature Survey

The data collection method used is comprehensive literature survey. The survey population is defined as all the books on environmental planning and management which were written in English and published in the United States after 1975. The sampling frame is obtained from "Subject Guide To Books In Print" published annually by Database Publishing Group. Simple random sampling was chosen as the sampling procedure.

All the books selected through the above process were searched in the libraries of Virginia Tech and University of Maryland at College Park. Approximately one fourth -- one hundred and sixty four books -- were found and checked out. I read through these books, making notes, comparing similar

contents. At last, four hundred concepts were developed and put into "Paradox". The database was named ENVIR. Every concept describes a best management practice (BMP) or a rudimental principle related to environmental planning.

III.2. "Paradox" -- A Powerful DBMS

"Paradox" is a powerful computer database-management system, performing management operations on a database that is stored on a computer disk. It allows one to add, change, delete, look up, and sort information (Simpson, 1989). A computer database is often organized into columns and rows and, thus, also called a table.

The ENVIR database developed in this study contains four hundred concepts. Every concept has five categories of information: [1] Title, [2] Brief Description, [3] Reference, [4] Key Words, and [5] Subject.

One concept represents one row, or record, on the database table. Each unique item of information (Title, Brief Description, Reference, Key Words, or Subject) represents one column (or field) of information. Each meaningful item of data is placed in a separate field, which gives the user of the database much freedom in managing the data.

"Paradox" can easily handle all of the following basic database-management tasks.

- * Adding new data to the database.
- * Sorting the data into a derived order.
- * Searching the database for types of information.
- * Printing data from the database onto formatted reports and graphs.
- * Editing data in the database.
- * Deleting data from the database (Simpson, 1989).

In "Paradox", a single table can contain the following quantities of information in these combinations:

- * 2 billion rows (records);
- * 4,000 characters on a single record;
- * 255 fields in a single record;
- * 255 characters within a single field (Simpson, 1989).

There is no limit to the number of tables that one can manage with Paradox, other than the amount of disk storage capacity that is available.

The "Paradox" Main menu is illustrated in Figure 4.

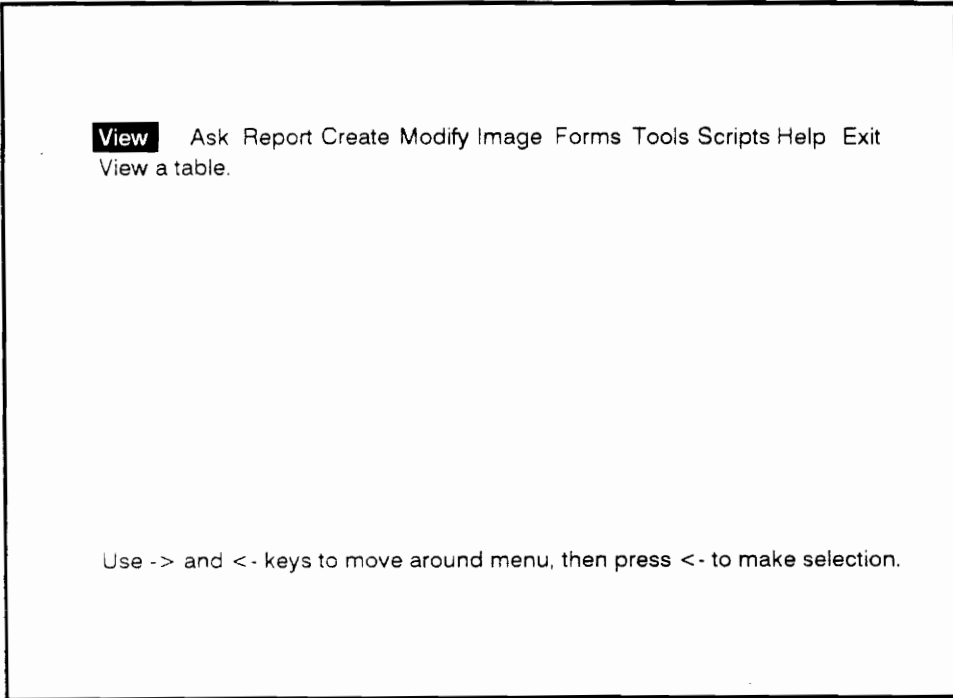


Figure 4. The Paradox Main menu.

(Simpson, 1989)

The main "Paradox" commands and their functions are listed in Figure 5.

Commands	Functions
View	View a table.
Ask	Get a query form to ask questions about a table.
Report	Output, design, or change a report specification.
Create	Create a new table structure.
Modify	Sort or edit a table, enter new records or restructure a table.
Image	Resize or format images; go to records or values; pick forms; specify graphs.
Forms	Design or change a form.
Tools	Rename, speed up queries, convert data, copy, delete, info, net, password.
Scripts	Play or record a script.
Help	Help with using Paradox.
Exit	Leave Paradox.

Figure 5. "Paradox" commands.

(Simpson, 1989)

III.3. "CyberQuest"

"CyberQuest" (CQ) is a hypermedia hardware/software system that can help with problem solving, strategic planning, and innovation support. It can assist individuals and groups employed in private or public sectors to come up with ideas and ways to implement these ideas. CQ contains databases of diverse concepts drawn from management, engineering, physics, sociology, science fiction, religion, and many other fields. CQ starts by having the user define an aim and search databases for diverse analogous concepts. These are employed by the user to generate ideas, which in turn can be screened, packaged, and evaluated (Dickey, 1991).

There are six basic steps in CQ:

- * The first step is concerned with problem description and analysis. This step involves the identification of an aim.

- * The second step starts into the solution phase by allowing selection of two pairs of key words (four key words) that point to possible concepts of value to help or achieve the aim.

- * In the third step, the selected key words lead to a range of concepts which in turn lead to idea generation with the help of searching for information that may be helpful.

- * Step four involves preliminary idea screening.

- * Step five is concerned with idea packaging and evaluation.

- * The reporting in Step six enables the user to summarize the results from the preceding steps as desired (Dickey, 1991).

"CyberQuest" provides its users large databases composed of concepts coming from over forty-five sources and covering a variety of topics. They all have four (two pairs) key words describing them which come from CQ's list. The user can select four key words, from a list of about two hundred provided by CQ, which best relate to the main words in the previously defined aim. The words describing the aim and those associated with a concept should match each other. Then, the matching concept is displayed on the screen and the user is asked to draw an analogy to generate an idea to help achieve the original aim (Dickey, 1991).

In order that the concepts of ENVIR database can be transferred to and used in CQ, every ENVIR concept is given a "Key Word" field. After the ENVIR concepts are put into CQ's databases, they can be searched according to their key words through CQ processes. (This is elaborated in Chapter V.)

Chapter IV. DEVELOPMENT OF ENVIR DATABASE

IV.1. Description of ENVIR Database

The database named ENVIR is developed to support decision making in environmental planning area. Environmental planning can be defined as the initiation and operation of activities to direct and control the acquisition, transformation, distribution, and disposal of resources in a manner capable of sustaining human activities, with a minimum disruption of physical, ecological, and social processes (Reekie, 1975).

Environmental planning and management is very difficult largely because of a general lack of sufficient and accurate information for proper decision making. The ENVIR database is an attempt in solving this problem.

The emphasis of ENVIR database is on local environmental planning and management because the demand for environmental quality is strongest locally and the majority of environmental monitoring, analyzing, and enforcing activities are accomplished by local agencies. In the words of Rene Dubos, "We must think globally and act locally."

The content of the ENVIR database is composed of:

- (a) diverse "best management practices" (BMPs) in environmental planning and management area,
- (b) rudimental principles in environmental planning and management area.

In the ENVIR database, environmental planning is divided into fifteen categories (subjects): environmental assessment, land use planning, environmental pollution control, air pollution control, water pollution control, noise pollution control, solid waste management (including recycling), water resource conservation, land resource conservation, natural resource conservation, soil conservation, landscape management, ecological protection (including wildlife protection), environmental management (including innovative management methods), and public participation.

The relationship of subject areas used in ENVIR database and those in "Subject Guide To Books In Print" (SGTBIP) is described in the following table (Figure 6).

ENVIR Subjects	"SGTBIP" Subjects
Environmental Assessment	Environmental Impact Analysis, Environmental Assessment
Land Use Planning	Land Use, Open Spaces, City Planning -- Zone System
Environmental Pollution Control	Environmental Pollution
Air Pollution Control	Air Pollution, Air Quality, Air Purification
Water Pollution Control	Water Pollution, Water Quality, Sewage Disposal
Noise Pollution Control	Noise Pollution, Noise Control
Solid Waste Management	Solid Waste Management, Refuse and Refuse Disposal, Recycling
Water Resource Conservation	Water Resource Development, Conservation of Water, Watersheds
Land Resource Conservation	Reclamation of Land
Natural Resource Conservation	Protection of Natural Resources, Conservation of Nature, Forests and Forestry
Soil Conservation	Soil Conservation, Soil Consolidation, Soil Erosion
Landscape Management	Landscape
Ecological Protection	Environmental Protection, Fisheries, Wildlife Conservation, Wildlife Management, Protection of Game
Environmental Management	Environmental Management, Environmental Policy, Environmental Control
Public Participation	Public Relations

Figure 6. Relationship between ENVIR and "SGTBIP" subjects.

IV.2. Development Process of ENVIR Database

The development process of ENVIR database consisted of three steps:

- [1] Literature collection.
- [2] Literature review and concept development.
- [3] Input of the four hundred concepts into a Paradox file.

In Step One, to carry out the literature survey efficiently, I decided to go through a sampling procedure: to draw a sample from all available sources. Since every year there have been hundreds of books on environmental planning published, it is impossible for me to read each of them in order to develop the ENVIR database.

The survey population is defined as all the books on environmental planning and management which were written in English and published in the United States after 1975. The sampling frame (population record) chosen is "Subject Guide To Books in Print" (SGTBIP), which was produced from the Bibliographic Information Publication System (BIPS) Database. This database is used to produce a complete, complementary line of bibliographic publications that gives booksellers, librarians, publishers, and other book users access to the latest bibliographic information. The BIPS Database includes

scholarly, popular, adult, juvenile, reprint, and all other types of books covering all subjects (assigned by the Library of Congress) provided they are published or exclusively distributed in the United States.

"Subject Guide To Books in Print" has a Subject Thesaurus (as Volume Five) listing all subject headings to help online users in searching by subjects in SGTBIP. Bibliographic entries contain the following information when available: author, co-author, title, edition, subject information, language (if other than English), number of pages, date of publication, etc. Entries are arranged alphabetically by author within subject. Subject headings, derived after those used in the card catalog in the Library of Congress, are explicit rather than general. Thus, books on air pollution are under "air pollution", not under "environmental pollution".

The sampling method chosen is simple random sampling, which gives each of the book in the population record an equal and non-zero probability of being selected. Specifically, every fifth book in the SGTBIP list was picked out. (More than six hundred books were picked out.) This procedure can produce a sample that is representative of the total population -- all books on environmental planning published since 1975.

The books selected through the process described above were searched in the libraries of Virginia Tech and University of Maryland at College Park. By utilizing the computers in these libraries, I searched every book by its title. Approximately one fourth (one hundred and sixty-four books) were found by the computers.

In Step Two, I read through the one hundred and sixty-four books, analyzing their contents, making notes, and comparing similar contents. Altogether four hundred concepts were developed.

In Step Three, the four hundred concepts were put into "Paradox". The database was named "ENVIR". The process is as follows:

- [1] Creating a new table structure: select the Create option from the Main menu and type in the name -- ENVIR -- of the new table. Then enter the table structure by typing in field names and the data type (Alphanumeric data) plus field width one by one. ENVIR table structure is shown in Figure 7.

NO.	Field Name	Alphanumeric Data
1	Title	A52
2	Brief Description	A255
3	Reference	A255
4	Key Words	A52
5	Subject	A50

* A255: A field of alphanumeric data and 255 characters.

Figure 7. ENVIR table structure.

[2] To add data to this table, use the Dataentry option from the Modify option on the Main menu and then type every unit of information into the appropriate cell within the row by column framework.

During the whole data input process, it was necessary to employ some other auxiliary "Paradox" functions:

* To view the data of ENVIR table, select the View option from the Main menu and type in "ENVIR".

* By drawing the Image option, I can change the table size, change the column width, jump the cursor to a particular field or record, change the order of columns, switch

between Table View and Form View, etc.

- * To edit and validate the data of ENVIR table, I will select the View option from the Main menu. The data can be edited in Table View (by pressing the Edit (F9) key), Form View (by pressing the Form Toggle (F7) key), or Field View (by pressing Alt-F5).

- * To sort ENVIR table -- ordering the data in a table alphabetically by Title -- I will select the Sort option under the Modify option from the Main menu. To specify a field to sort by, place a 1 next to the field name on the sort form that "Paradox" displays.

- * To protect the ENVIR data, I select the Password option from the Protect submenu under Tools menu, type the password in and press Enter. The screen will ask me to enter it again to verify that I have typed the password correctly. Afterwards, whenever I want to edit the ENVIR table, I must show that I am authorized to access ENVIR by typing the password at the terminal when asked to do so by "Paradox" (Simpson, 1989).

Chapter V. HOW TO USE ENVIR DATABASE

ENVIR database can be used both in "Paradox" and "CyberQuest".

V.1. To Use ENVIR Database in "Paradox"

In the "Paradox" system, the utilization of ENVIR database takes several forms: querying, reporting and interfacing with other software systems (Simpson, 1989).

To query (or search) a database table means to pull out all records that meet some criteria, for example, to view only those concepts which are under the subject of Solid Waste Management or Ecological Protection (Simpson, 1989). This function is extremely useful in helping a decision maker search the specific information he needs. Without querying, a database file does not need to exist.

"Paradox" has tremendous capacity to do the relatively straightforward task of querying. ENVIR database can be examined to determine a wide variety of characteristics of the links included in the database. Several techniques are illustrated below for searching ENVIR database through query forms.

The user can call up the query form at any time by selecting the ASK option from the "Paradox" main menu. It is a little easier to work with query forms after the screen is cleared by pressing CLEAR ALL (Alt-F8). When the ASK option is prompted, specify ENVIR as the table to ask about (Simpson, 1989). The user will see a query form as in Figure 8.

[F6] to include a field in the ANSWER; [F5] to give an Example				Main
ENVIR	Title	Brief Description	Reference	Key Words

Figure 8. The "Paradox" query form for the ENVIR table.

The user can enter and change data on the query form as he does with tables. That is, the arrow keys move the cursor, the Backspace key erases characters that he has typed, and FIELD VIEW (Alt-F5) allows the user to make more refined edits (Simpson, 1989).

The user may not want to see all the fields in a table when querying. He can specify which fields to display by putting check marks in those fields. Pressing the CheckMark (F6) key toggles the check-mark symbol. That is, pressing CheckMark once puts a check mark into a field. If the user changes his mind, he can just press CheckMark again to erase the check mark (Simpson, 1989).

The user can quickly enter check marks into all the fields on the query form by pressing the CheckMark (F6) key while the cursor is in the leftmost column. Pressing the CheckMark key a second time erases all the check marks.

If the user wishes to view only the titles and subjects from the ENVIR table, he can use the arrow keys and CheckMark (F6) key and place a check mark in the Title and Subject fields, as shown in the top half of Figure 9.

Pressing DO-IT! (F2) after entering the check marks, the

user will see the Title and Reference fields from the ENVIR table displayed on the screen, as in the bottom half of Figure 9.

Viewing Answer table: Record 1 of 400				
Title *	Brief description	Reference	Key Words	Subject *
ANSWER	Title			Subject
1	Access Road			Soil Conservation
2	Acquisition of Easements			Land Use Planning
3	Acquisition of Floodplain			Land Resource Conservation
4	Activate-Sludge Process			Water Pollution Control
5	Aerated Lagoon			Water Pollution Control
6	Agricultural/Clustering Zone			Land Use Planning
7	Agricultural Zoning Strategy			Land Use Planning
8	Air-Pollution C/B Model			Air Pollution Control
9	Air Pollution Classification			Air Pollution Control
10	Air Pollution Sampling			Air Pollution Control
11	Air Pollution Control Strategy			Air Pollution Control
12	Air Pollution Sources Control			Air Pollution Control
13	Air Pollution Standards			Air Pollution Control
14	Air Pollution Surveillance System			Air Pollution Control
15	Air-Resource Decision-Making Process			Air Pollution Control
16	Alternative Residential Arrangements			Land Use Planning
17	Ambient Standards Approach			Environmental Pollution Control
18	Anco-Torrax Refuse Pyrolysis System			Solid Waste Management
19	Areas of Critical Environmental Concern			Land Use Planning
20	Artificial Water Recharge			Water Resource Conservation

Figure 9. Viewing two fields from the ENVIR table.

Notice that the table displaying the data is named Answer. This is not the same table as ENVIR; it is only an image of the data from the ENVIR table, displaying the fields requested by the user. Note also that the record numbers on the Answer table may not correspond to those on the ENVIR table. The user should not do any editing on the Answer table because it will not be reflected in the original ENVIR table.

To create a printed copy of the answer to the specified query, make sure the printer is ready, then press Instant Report (Alt-F7) (Simpson, 1989).

After viewing his answer, the user may simply press the Clear Image (F8) key, which will bring him back to the query form. The user can change the query form and perform another query, or press CLEAR IMAGE (F8) to clear the query form and return to the Main menu (Simpson, 1989).

"Paradox" automatically displays data in the Answer table sorted in ascending order. If several columns are included in the Answer table, the leftmost column determines the sort order.

The user can also have "Paradox" display data in the resulting Answer table in descending order quite easily. When

placing check marks in the query form, use Ctrl-F6 rather than F6 or Alt-F6. Pressing Ctrl-F6 displays a check mark followed by a down-pointing triangle in the query form (Simpson, 1989).

Besides placing check marks in the query form, the user can enter criteria that define the types of records he wants to display. For example, the user wants to see the Title and Brief Description of all concepts which are under Land Use Planning subject. First, he starts with a fresh query screen by pressing Clear Image (F8) until only the Main menu appears on the screen. Select the Ask option, and then specify ENVIR as the table to query.

Then the user places a check mark in the Title, Description, and Subject fields, using the usual arrow and CheckMark (F6) keys. To specify that only the concepts of Land Use Planning subject be displayed, the user must type the letters "Land Use Planning" next to the check mark in the Subject field, as shown at the top of Figure 10.

Press DO-IT! to perform the search. The Answer table will display only Land Use Planning concepts, and only those fields one has checked, as shown in the bottom half of Figure 10.

Viewing Answer table: Record 1 of 55

Title *	Brief description *	Reference	Key Words	Subject * Land Use Planning
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ANSWER	Title	Brief Description	Subject
1	Acquisition of Easements	This land use control tool involves ...	Land Use Planning
2	Agricultural/Clustering ...	Farmers are allowed to subdivide a ...	Land Use Planning
3	Agricultural Zoning ...	A new type of instrument of agricultural ...	Land Use Planning
4	Alternative Residential ...	Clustered groupings of townhouses ...	Land Use Planning
5	Areas of Critical ...	Designation of "areas of critical ...	Land Use Planning
6	Charles Haar Land Banking	Charles Haar proposed the creation ...	Land Use Planning
7	Cluster Zoning	Also called average density zoning, ...	Land Use Planning
8	Conditional Use	A new zoning device. Conditional uses ...	Land Use Planning
9	Conservation Easements	An open space preservation technique. ...	Land Use Planning
10	Cost-Saving Approaches ...	The approaches include acquisition at ...	Land Use Planning
11	Davenport Land Banking	Davenport, Iowa, allocated funds from ...	Land Use Planning
12	Density Regulation Strategy	Development density regulation methods ...	Land Use Planning
13	Development Planning ...	In order for the development to conform ...	Land Use Planning
14	Dimensional Control	A traditional zoning technique that ...	Land Use Planning
15	Environmental Constraint ...	Specified applications of environmental ...	Land Use Planning
16	Fairfax Revolving Fund	Fairfax County, VA, created a \$500,000 ...	Land Use Planning
17	Floating Zone	An innovative zoning device. It is a ...	Land Use Planning
18	Floor Area Ratio Device	An innovative zoning techniques. The ...	Land Use Planning
19	Growth/Development Phasing	This technique is for municipalities...	Land Use Planning
20	Growth Management Strategy	Growth management/control tools ...	Land Use Planning

Figure 10. A Search for Land Use Planning concepts.

This same technique will work with any field. When searching for letters and words, the user must match the case he used in the original table. For example, a search for "land use planning" (instead of "Land Use Planning") would produce nothing because the cases do not match.

If the user wants to view records for every concept in the table except those whose subject is land use planning, he would use "not operator" in that case. For example, placing the criterion

not Land Use Planning

in the Subject field results in an Answer table containing all the concepts except those whose subject is Land Use Planning.

Sometimes, the user might want to view records that match some pattern or contain a certain sequence of characters, for example, all concepts that have the word "innovative" in its Brief Description. Sometimes, the user wants to look up a concept describing "Eutrophication" but not sure of the spelling, he might wish to view records that are spelled like Eutrophication (though not exactly). The operators that the user can use for these types of searches are listed in Figure 11.

Operator	Meaning
..	Stands for any series of characters, numbers, spaces, and so on
@	Stands for any single character
like	Matches items similar to the criterion
not	Preceding the criterion, matches items that do not match the criterion

Figure 11. Search Operators of "Paradox".

(Simpson, 1989)

Suppose the user wants to list all concepts which are more or less related to "landfill". Since the word landfill will be embedded somewhere in the middle of the Brief Description, he can use the ".." operator to indicate any characters both preceding and following the word "landfill". Then all the concepts with the word landfill embedded in the Brief Description field will be displayed.

The user can, of course, be more specific in his query for concepts related to landfill. For example, a query such as ..landfill..leachate..

would list any records with Brief Descriptions that contains both "landfill" and "leachate" with any characters before, after, and in between them.

The @ operator is used to match a single character, as opposed to any series of characters (Simpson, 1989). For example, a search for

C@ap..

in the Reference field would find all the records containing names Chapin and Clapham in their Reference fields.

The use of upper- and lower-case letters will sometimes mislead a query. As mentioned earlier, a query for all "land use planning" concepts would display nothing, since "Land Use

Planning" is stored with the first letter of every word in uppercase in all records. This could be a problem if the user were not absolutely certain of the case in all records. But using the like operator takes care of the problem.

The user should use the like operator liberally, since it may find records with slight misspellings that might otherwise have gone unnoticed. Similarly, if the user is not absolutely sure of the spelling of something he is trying to find, he should try the like operator.

The "Not" operator reverses the meaning of any query criterion (Simpson, 1989). For example, the criterion "not Land Use Planning" displays records that do not have Land Use Planning in their Subject fields.

After finishing the query, the user often need to print out all the information drawn from the ENVIR database through the query procedure in a specific format. This is called reporting. The user can use the "Paradox" report generator to design and develop reports (Simpson, 1989). The reporting process is as follows:

- [1] Design a report format: A report format can be specified by selecting the Design option under Report option from

the Main menu (Simpson, 1989). The type of report I select is Free-Form, which is shown in Figure 12.

Title:	AA
Brief Description:	AA AAA AAA AAA AAAAAAAA
Reference:	AA AAA AAA AAA AAAAAAAA
Key Words:	AA
Subject:	AA

Figure 12. Report design: Free-form.

[2] Presort the table: the table can be sorted into alphabetical order by Title by selecting the Modify option from the Main menu and the Sort option from the submenu, then specify the ENVIR table, and select Same when asked how to sort the table. Press the DO-IT! (F2) key (Simpson, 1989). After a brief delay, the data will appear on the screen in the appropriate sort order.

[3] Print a report from the Main menu: Pull up the Main menu (F10) and then select Report option (Simpson, 1989). Selecting Output option from the submenu will display on the screen a subsubmenu:

Printer	Screen	File
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Selecting the Printer option will print the report. Selecting Screen displays the report on the screen only. Selecting File allows the user to assign a file name, and then the report is stored on disk under the file name he assigns (Simpson, 1989).

"Paradox" can also interface with other software systems: the ExportImport option under the Tools menu allows the user to transfer data to and from other software systems, such as

Quattro, DBase (II, III, & IV), Word Processors (WordPerfect), etc (Simpson, 1989). The data stored in "Paradox" can be easily transferred to these software systems.

V.2. To Use ENVIR Database in "CyberQuest"

ENVIR database can also be used in "CyberQuest"(CQ), which is a powerful software system employed in a guided search for solutions to problems. A most important tool CQ offers to its users is that the system provides access to vast databases of information. These databases contain thousands of diverse concepts drawn from diverse fields. Every concept has a title, a description, and four key words, which is very similar to the structure of ENVIR concepts. CQ starts by having the user define an aim and search databases for diverse analogous concepts. These are employed by the user to generate ideas (Dickey, 1991).

Once the ENVIR database is installed in CQ as a part of its databases, an environmental planner can search this database by using the key words provided by CQ during the six-step operation process of CQ, which will help him a lot in decision making and problem solving. The six basic steps in CQ are:

- [1] Problem Description and Analysis.

- [2] Key Words Selection.
- [3] Generation of Ideas.
- [4] Idea Screening.
- [5] Idea Packaging and Evaluation.
- [6] Reporting (Dickey, 1991).

CQ contains about two hundred key words. Approximately one hundred and thirty of these are "Subjects" (nouns), divided into the categories of Natural Environment, Manmade Environment, Groups of People, Bodily Functions, and Abstractions (Dickey, 1991). Notice that these "Subjects" are different from the Subjects of ENVIR concepts. The former are key words used in CQ to match concepts; the latter are subjects of the ENVIR concepts and can only be used as query indicators within "Paradox" but not after the concepts have been transferred into CQ. The remaining key words are "descriptor pairs" (adjectives), such as "Polluted/Unpolluted", and "Stable/Unstable".

The user must select two words from the first set (nouns) and two pairs from the second (adjectives). The selected four key words can be used to find all the concepts in CQ databases which match the user's goal(s) (Dickey, 1991).

In the Key Words field of every ENVIR concept, only the

two "pair" key words are listed. (Every ENVIR concept has different "pair" key words.) When transferred into CQ databases, every ENVIR concept will be given two identical "Subject" key words -- Natural Environment and Manmade Environment -- which are to be added in the Key Words field.

The operation process of the first three steps in CQ after the ENVIR data has been put into CQ databases is illustrated as follows:

Step 1. Starting a New Case.

- [1] Start the CyberQuest program.
- [2] Start a new case.
- [3] Name the new case: ENVIR.
- [4] Identify the goal of the new case: to improve the existing solid waste management system of Town Nowhere.
- [5] Return to Process menu.

Step 2. Selecting Key Words.

- [1] Look at the list of possible key words.
- [2] Make choice of two subject words: Natural Environment and Manmade Environment.
- [3] Make choice of two descriptor pairs: New/Old and Polluted/Unpolluted.

[4] Return to Process menu.

Step 3. Generating Ideas.

[1] Go to Idea Generation Menu.

[2] Choose a source of concepts by using "Search on Key Words".

[3] Search for concepts: conducted automatically by CQ. The concepts matching the previously selected key words are listed in Figure 13.

Title: Andco-Torrax Refuse Pyrolysis System
Brief Description: This innovative system converts mixed municipal ...
Reference: [1] Homels,J.R., Refuse Recycling and Recovery ...
Key Words: Natural Environment, Manmade Environment,
New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Black Clawson Hydrasposal System
Brief Description: This is an innovative solid waste recycling ...
Reference: [1] Jackson,F.R., Recycling and Reclaiming of ...
Key Words: Natural Environment, Manmade Environment,
New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Compactor Truck System
Brief Description: An efficient refuse-collection method. In ...
Reference: [1] Berry,B.J.L. & Horton,F.E., Urban ...
Key Words: Natural Environment, Manmade Environment,
New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: CPU-400 System
Brief Description: CPU-400 is a pilot incinerator system which ...
Reference: [1] Rimberg,D., Municipal Solid Waste ...
Key Words: Natural Environment, Manmade Environment,
New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Disposal System Maintenance
Brief Description: Maintenance services of on-site disposal ...
Reference: [1] Weiss,S., Sanitary Landfill Technology ...
Key Words: Natural Environment, Manmade Environment,
New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Fire Prevention in Landfills
Brief Description: Fire prevention methods in sanitary landfills ...
Reference: [1] Herriman,R.C., Soil and Landscape Factors ...
Key Words: Natural Environment, Manmade Environment,
New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Flakt RRR System
Brief Description: This is an innovative system in Swede aimed ...
Reference: [1] Homels,J.R., Refuse Recycling and Recovery ...
Key Words: Natural Environment, Manmade Environment,
New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

.....

Figure 13. ENVIR concepts selected by CQ.

[4] Enter and edit ideas, notes, and goals.

[5] Return to Process Menu.

Chapter VI. FUTURE RESEARCH AND CONCLUSION

VI.1. Future Research

This study has developed the ENVIR database by using "Paradox" (a powerful database management system (DBMS)) to be employed in environmental decision support system (EDSS). There are two points for future research work.

[1] The ENVIR database must be a dynamic one in order to be useful, that is, the content of this database must be updated continuously. Old concepts should be modified and new concepts should be added so that the ENVIR database could catch up with the rapid progress of environmental planning theory and practice.

[2] More specific "subject" key words are to be put in the Key Words field of every ENVIR concept so that the ENVIR database can be better used after transferred into CyberQuest.

IV.2. Conclusion

As a conclusion, some expected influence of EDSS and DBMS in environmental planning are presented as follows:

- [1] The number of applications of EDSS and DBMS in environmental institutions will increase rapidly.
- [2] The effectiveness and efficiency of decisions in terms of environmental planning and management will increase significantly because decisions can be reached faster and the quality of decision process will increase.
- [3] The basis of a decision concerning environmental issues will be more objective because it will be possible to access similar problem formulations, to review the information in the database, and to produce fast prototypical solutions by utilizing EDSS and DBMS.
- [4] The number and variety of people involved in decision processes will increase since it will be easier to access information.
- [5] It will be easier for experts to be involved in decision processes since they will have better technical opportunities to present their proposals in a more understandable way.

Appendix I

ENVIR Database

Title: Access Road
Brief Description: A road constructed to minimize soil erosion while providing needed access. This is also a good management practice for controlling nonpoint pollution from rural land uses.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 152. [2] U.S. SCS, Potential Best Management Practices to Control Sediment Non-Point Source Pollution from Agricultural Land in North Carolina, 1978, pp. 8 -- 11.
Key Words: Accessible/Inaccessible, Stable/Unstable
Subject: Soil Conservation

Title: Acquisition of Easements
Brief Description: This measure involves paying private property owners a portion of the market value of their land in return for their agreement not to develop their property for certain uses that threaten environmental quality.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 180 -- 181. [2] Miller, L. & Burby, R.J., Protecting Drinking Water Supplies through Watershed Management: A Case Book for Devising Local Programs, 1981, pp. 239 -- 256.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Acquisition of Floodplain
Brief Description: Acquisition of floodprone land is one of many techniques available to state and local governments to reduce future flood damages and storm-water management costs, increase groundwater recharge, permit restoration of wetlands, and protect natural values.
Reference: [1] Field, R.M., State and Local Acquisition of Floodplains and Wetlands, 1981, pp. 3 -- 15. [2] French, S.P., Managing Flood Hazard Areas: A Field Evaluation of Local Experience, 1979, pp. 46 -- 67.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Activated-Sludge Process
Brief Description: Activated-sludge process is a waste-treatment approach to achieve the decomposition of organic wastes. If the process is operating properly, a few hours is sufficient to reduce the BOD of most degradable organic wastes by 90%.
Reference: [1] Hines, L.G., Environmental Issues, 1983, pp. 231 -- 233. [2] Imhoff, K. & Fair, G.M., Sewage Treatment, 1980, pp. 45 -- 48. [3] Viessman, W.Jr. & Welty, C., Water management, 1985, pp. 529 -- 531.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Aerated Lagoon
Brief Description: This type of aerobic biological treatment system uses mechanical aeration to supply oxygen to the wastewater during storage. Two types of aeration devices are bubble diffusers and mechanical mixers located at the surface of the wastewater.
Reference: [1] Lamb, J.C., Water Quality and its Control, 1985, pp. 275 -- 276. [2] Culp, R.L. & Culp, G.L., Advanced Wastewater Treatment, 1981. [3] Imhoff, K. & Fair, G.M., Sewage Treatment, 1980, pp. 45 -- 48.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Agricultural / Clustering Zone
Brief Description: Farmers are allowed to subdivide a portion of their land, the number of lots being determined by a sliding scale and the size of their overall holdings. The remainder of the holdings is then restricted to agricultural use.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 173. [2] Miller, T.L. & Raymond, J.B., Protecting Drinking Water Supplies Through Watershed Management, 1981, pp. 60 -- 61.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Agricultural Zoning Strategy
Brief Description: A new type of instrument of agricultural zoning initiated in California is a voluntary contract between the land owner and local government to encourage stability in agricultural land use and compensation features are developed to encourage participation.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 262 -- 265. [2] Kusler, J.A., Regulating Sensitive Lands, 1980, pp. 3 -- 10. [3] Erwin, D.E., Land Use Control, 1977, pp. 134 -- 135.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Air-Pollution C/B Model
Brief Description: In air pollution control, cost/benefit analysis can be employed to compare the social costs and benefits resulting from a potential air-resource policy.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 141 -- 164. [2] APCO-EPA, A Model for Regional Air Pollution Cost-Benefit Analysis, 1975.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Air Pollution Classification
Brief Description: Two main classes of air pollution are generally recognized: [1] industrial air pollution associated with emissions from industrial plants, [2] photochemical pollution directly tied to automobile emissions.
Reference: [1] Catanese, A. C. & Snyder, J. C., Urban Planning, 1988, pp. 298. [2] Hagevik, G., Decision Making in Air Pollution Control, 1980, pp. 79 -- 82. [3] Tebbens, B.D., Air Pollution, 1978, p. 690 -- 670.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Air-Pollution Sampling
Brief Description: A variety of sampling devices are used to evaluate ambient air quality in air-pollution surveillance: sulfation devices, hi-vol, gas sampler, spot tape sampler, particulate-soiling, etc.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 97 -- 98. [2] Tebbens, B.D., Air Pollution, 1978, pp. 690 -- 694. [3] Bretschneider, B. & Kurfurst, J., Air Pollution Control Technology, 1987, pp. 124 -- 127.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Air Pollution Control Strategy
Brief Description: Air pollution control contains consumption reduction, industrial efficiency improvement, emissions controls, taller stacks employment, emitters isolation, etc.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 158. [2] Warren, J.L., Green Space for Air Pollution Control, 1983, pp. 118 -- 167. [3] Miller, E.W. & Miller, R.M., Environmental Hazards: Air Pollution, 1989, pp. 9 -- 37.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Air Pollution Sources Control
Brief Description: Local authority should prevent construction or operation of a facility or structure which may result in emissions of large amounts of vehicle-related pollutants. Examples include large regional shopping centers, major highways and airports, etc.
Reference: [1] Hagevik, G., Mandelker, D.R., & Brail, R.K., Air Quality Management and Land Use Planning, 1984, pp. 28 -- 32. [2] Hagevik, G., The Relationship of Land Use and Transportation Planning to Air Quality Management, 1982, pp. 228 -- 230.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Air Pollution Standards
Brief Description: Air pollution standards include minimum emission standards, minimum ambient air quality standards, open burning regulations, suspended particulates, particle fallout, etc.
Reference: [1] Haskell, E.H. & Price, V.S., State Environmental Management, 1983, pp. 14, 16, 86. [2] Warren, J.L., Green Space for Air Pollution Control, 1983, pp. 11 -- 16. [3] Hagevik, G., Decision Making in Air Pollution Control, 1980, pp. 67 -- 68.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Air-Pollution Surveillance System
Brief Description: An air-pollution surveillance system serves to identify the pollutants emitted to the air, to record their trends and patterns, to evaluate the process in meeting pollution standards, and to facilitate direct enforcement activities.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 96 - 99. [2] Esposito, J.C., Vanishing Air, 1980, pp. 23. [3] Tebbens, B.D., Air Pollution, 1978, pp. 63 -- 67.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Air-Resource Decision-Making Process
Brief Description: The air-resource decision-making process is combined procedures of economic, cost-benefit, and systems analysis using social/economic indicators (such as economic efficiency, economic distribution, etc) as evaluation criteria.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 162 -- 166. [2] Azriel, T., Air Pollution Abatement: Economic Rationality and Reality, 1977, pp. 1082 -- 1098.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Alternative Residential Arrangements
Brief Description: Clustered groupings of townhouses permit a reduction in build-over land, and enable the preservation of a larger extent of open, vegetated land at a gross density equivalent to traditional single-family house layouts.
Reference: [1] Bosselman, F.P. & Callies, D., The Quiet Revolution in Land use Controls, 1982, pp. 531 -- 547. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 519 -- 520.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Ambient Standards Approach
Brief Description: Under the ambient standards approach, the community determines the level of a particular environmental contaminant that it will tolerate and then establishes the performance standards ensuring that these levels are not exceeded.
Reference: [1] Hagevik, G. & Mandelker, D.R., & Brail, R.K., Air Quality Management and Land Use Planning, 1984, pp. 170 -- 180. [2] Roos, L.L.Jr. & Roos, N.R., Pollution, Regulation and Evaluation, 1981, pp. 301 -- 302.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Andco-Torrax Refuse Pyrolysis System
Brief Description: This innovative system converts mixed municipal refuse (metal, glass, garbage, etc.) into usable heat energy without producing secondary pollution to land, air, or water. Refuse is processed without sorting or pre-treatment.
Reference: [1] Holmes, J.R., Refuse Recycling and Recovery, 1981, pp. 95 -- 99. [2] Jackson, F.R., Energy from Solid Waste, 1979, pp. 29 -- 31.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Areas of Critical Environmental Concern
Brief Description: Designation of "areas of critical environmental concern" is a zoning strategy. Examples of said "areas" include floodplain, wetlands, steep slopes, shorelands, aquifer recharge areas, and wildlife habitats.
Reference: [1] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 4 -- 7. [2] Marsh, W. M., Environmental Analysis, 1978, pp. 199 -- 200.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Artificial Water Recharge
Brief Description: Artificial water recharge can be practiced for storage of excess surface water and amelioration of damage caused by excessive pumping. Methods for performing artificial recharge include surface spreading, direct injection, and induced recharge from a stream.
Reference: [1] Viessman, W.Jr. & Welty, C., Water management, 1985, pp. 114 -- 115. [2] Biswas, A.K., Water Supply and Management, 1978, pp. 79 -- 90. [3] Clark, J.W., Water Supply and Pollution Control, 3rd ed., 1977, pp. 172 - 178.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Assessment Techniques of Environmental Impact
Brief Description: Techniques of environmental impact assessment include ecological evaluation, determining the zone of visual influence and landscape evaluation.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 72. [2] Warner, L. & Preston, E., A Review of Environmental Impact Assessment Methodologies, 1984, pp. 37 -- 90.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Biological Treatment Devices
Brief Description: Biological treatment of wastewater can be accomplished by using storage ponds, aerated lagoons, oxidation ponds, activated sludge, trickling filters, activated carbon, stripping, ion exchange, etc.
Reference: [1] Lamb, J.C., Water Quality and its Control, 1985, pp. 274 -- 281. [2] Culp, R.L., & Culp, G.L., Advanced Wastewater Treatment, 1971. [3] Mancy, K.H., Instrumental Analysis for Water Pollution Control, 1980, pp. 99 -- 105.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Biophysical Data in Resource Planning
Brief Description: In natural resource planning areas, biophysical data include soils, vegetative cover, surface and ground water hydrology, active geomorphic processes, climate, land form, and present or potential wildlife resources and habitats.
Reference: [1] Dasmann, R., Environmental Conservation, 1986, pp. 41 -- 42. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 449. [3] Ratcliffe, D.A., Nature Conservation: Aims, Methods and Achievements, 1977, pp. 11 -- 12.
Key Words: Informed/Uninformed, Stable/Unstable
Subject: Natural Resource Conservation

Title: Black Clawson Hydrasposal System
Brief Description: An innovative solid waste recycling system set up in Hempstead, Long Island. Raw residential and commercial garbage and trash is conveyed into the Hydrasposal where all metals could be reclaimed.
Reference: [1] Holmes, J.R., Refuse Recycling and Recovery, 1981, pp. 101 -- 106. [2] Jackson, F.R., Recycling and Reclaiming of Municipal Solid Wastes, 1985, pp. 200 -- 202. [3] PDER, Solid Waste management, 1981, pp. 219 -- 220.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste management

Title: BMPs for Urban Runoff
Brief Description: Best management practices (BMPs) for urban runoff include: utilization of greenways and detention ponds, avoidance of steep slopes for development, utilization of porous pavements where applicable, control of litter, regular street sweeping, etc.
Reference: [1] Viessman, W.Jr. & Welty, C., Water management, 1985, pp. 554 -- 555. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1975, pp. 306 -- 310.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Buffer Zones
Brief Description: Noise pollution can be reduced through the use of buffer zones which separate emitters from receptors. Two properties of the buffer itself should be considered -- its size and the type of vegetation in the buffer zone.
Reference: [1] Aylor, D.E., Noise Reduction by Vegetation and Ground, 1982, pp. 197 -- 205. [2] Hagevik, G., Mandelker, D.R., & Brail, R.K., Air Quality Management and Land Use Planning, 1984, pp. 124 -- 144.
Key Words: Polluted/Unpolluted, Quite/Loud
Subject: Noise Pollution Control

Title: Capital Improvements Management
Brief Description: The management of the location and timing of capital improvements can provide the withholding of water and sewer facilities from sensitive areas in an effort to protect environmental quality.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 182 -- 183. [2] Rowe, P.G., Mixson, J., Smith, B.A., Blackburn, J.B., Callaway, G.L., & Gerirtz, J.L., Principles for Local Environmental Management, 1978, pp. 254 -- 255.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Centralization of Development
Brief Description: Automobile-related air pollution in cities might be reduced through the implementation of policies designed to encourage the development of more concentrated urban land use patterns.
Reference: [1] Horowitz, J.L., Air Quality Analysis for Urban Transportation Planning, 1982, pp. 295 -- 330. [2] Liu, M.K. & Seinfeld, J.H., Atmospheric Environment, 1975, Vol.9, pp. 555 -- 574. [3] Wark, K. & Warner, C.F., Air Pollution: Its Origin and Control, 1990, pp. 435.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Channel Stabilization Construction
Brief Description: Structures in streams to improve fish habitat by reducing bank or channel erosion or scouring, includes gibbons, cabled logs, log deflectors, and fencing.
Reference: [1] US Dept of Agriculture, Wildlife and Fish Habitat Management in the Forest Service, 1983, pp. 127. [2] Burger, G.V., Practical Wildlife Management, 1990, pp. 175 -- 176 . [3] Giles, R., Wildlife Management, Techniques, 1990, pp. 178 -- 180.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Charles Haar Land Banking
Brief Description: Charles Haar proposed the creation of metropolitan authorities with the power to acquire, manage, and dispose of land in accord with a metropolitan plan in order to improve the functioning of the urban land market and suburban land conversion process.
Reference: [1] Strong, A.L., Land Banking, 1979, pp. 260. [2] Flechner, H.L., Land Banking in the Control of Urban Development, 1984, pp. 187 -- 189. [3] Seneker, C.J., Land Use Regulations for Urban Growth Control, 1984, pp. 142 -- 143.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Charrette Method
Brief Description: Charrette method is a highly interactive approach for better structuring community participation by conducting intensive workshops in which experts (planners, administrators, and engineers) and citizens work together in a mutual learning atmosphere.
Reference: [1] Stuart, D.G., Systematic Urban Planning, 1976, pp. 4 -- 5. [2] Manheim, M.L., Community Values in Highway Location and Design: A Procedural Guide, pp. 71 -- 74. [3] Altshuler, A., Community Control, 1980, pp. 39 -- 40.
Key Words: Active/Passive, Affiliative/Introverted
Subject: Public Participation

Title: Citizen Controls
Brief Description: Citizen controls and other checks on public programs can take the forms of open meetings, open records, right to initiate public action, public hearings, written opinions, and appeals.
Reference: [1] Haskell, E.H. & Price, V.S., State Environmental Management, 1983, pp. 21 -- 22. [2] Altshuler, A., Community Control, 1980, pp. 3 -- 10. [3] Kotler, M., Neighborhood Government, 1977, pp. 2 -- 5.
Key Words: Active/Passive, Affiliative/Introverted
Subject: Public Participation

Title: Cluster Zoning
Brief Description: Also called average density zoning, it permits more flexible design of developments built as a unit. Development can be concentrated on the best parts of a site, thereby preserving the more environmentally vulnerable parts.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 172 -- 173. [2] Bosselman, F.P. & Callies, D., *The Quiet Revolution in Land use Controls*, 1982, pp. 433 -- 435.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Compaction
Brief Description: Compaction is an innovative solid waste management method which increases the weight of refuse occupying a given volume of space in order to achieve the conservation of landfill space.
Reference: [1] Rimberg, D., *Municipal Solid Waste Management*, 1975, pp. 74 -- 77. [2] Frey, D.N., *Policies for Solid Waste Management*, 1980, pp. 65 -- 67. [3] Stirrup, F.L., *Public Cleansing: Refuse Disposal*, 1975, pp. 21.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Compactor Truck System
Brief Description: An efficient refuse-collection method. In compactor trucks, waste is compressed by hydraulic presses, which saves vehicle space and cuts the number of trips necessary to cover collection routes. But, recyclables would be contaminated by unusable waste.
Reference: [1] Berry, B.J.L. & Horton, F.E., *Urban Environmental Management*, 1984, pp. 253 -- 254. [2] William, S., *Third Pollution: Problem of Solid Waste Disposal*, 1975, pp. 123 -- 125.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Component Interaction Matrix
Brief Description: An environmental impact analysis method. In this matrix, impacts are related to the connections of dependency between environmental components, thereby allowing indirect impacts to be identified.
Reference: [1] Lovejoy, D., *Land Use and Landscape Planning*, 1979, pp. 63 -- 64. [2] Roberts, R.D., *Planning and Ecology*, 1984, pp. 83 -- 87. [3] Ryding, S.O., *Environmental Management Handbook*, 1992, pp. 249 -- 252.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Composing / Waterless Toilets
Brief Description: An innovative wastewater treatment system. They can reduce the average household consumption of potable water by nearly 50%, recover valuable nutrients for domestic use, and eliminate a large source of water pollution.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 183. [2] Handley, D., Effluent Treatment and Waste Disposal, 1990, pp. 238 -- 246.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Composting
Brief Description: Composting is a controlled solid waste disposal process where domestic, agricultural, and/or commercial refuse is first prepared and then allowed to decompose, resulting in an inoffensive material which can be used as a soil conditioner.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 67 -- 70. [2] Satriana, M.I., Large Scale Composting, 1984. [3] Frey, D.N., Policies for Solid Waste Management, 1980, pp. 100 -- 103.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Concentrated Incineration
Brief Description: The burning of wastes under carefully controlled conditions. A somewhat expensive alternative to the open dump. Incinerators can reduce the volume of waste by more than 80% (extending the life of a landfill) and remove odors and disease-causing agents.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 206. [2] Frey, D.N., Policies for Solid Waste Management, 1980, pp. 169 -- 173. [3] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 59 -- 66.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Concord Conservation Commission
Brief Description: Concord, a historical town 10 miles west of Boston, created a Conservation Commission committed to the preservation of open space through the acquisition of land, flood plain zoning, easements, cluster zoning, and other techniques.
Reference: [1] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 35 -- 37. [2] Patterson, T.A., Land Use Planning: Techniques of Implementation, 1979, pp. 90 -- 92.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Conditional Use
Brief Description: A new zoning device. Conditional uses refer to those special uses in each zone subject to special permit upon the approval of the planning authority after a report by the planning director and a public hearing.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 47. [2] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 173.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Conservation Cropping System
Brief Description: Growing crops in combination with needed cultural and management measures to improve the soil and protect the soil during periods when erosion occurs.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 152. [2] Kusler, J.A., Regulating Sensitive Lands, 1980, pp. 32. [3] Brady, N.C., Agriculture and the Quality of Our Environment, 1983, pp. 93.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Conservation Easements
Brief Description: An open space preservation technique. The government acquires the conservation or development easement of land that it wants to see kept permanently as open space. The easement can be acquired by gift or by voluntary or compulsory purchase.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 69 -- 70. [2] Strong, A.L. & Keene, J.C., Environmental Protection through Public and Private Development Controls, 1983, pp. 10 -- 12.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Continued Planning
Brief Description: A continued planning program is for advancing effective environmental management, often including periodical plan reviewing/updating, an inventory system, periodical implementation assessment, continuing technical/financial/legal assistance, etc.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 226. [2] Henning, D.H., Environmental Policy and Administration, 1984, pp. 49 -- 51. [3] Sewell, G.H., Environmental Quality Management, 1975, pp. 2.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Contour Stripcropping
Brief Description: A soil conservation tool. Plowing along the contours of the land can reduce soil erosion by 50%. Alternating strips of close-growing crops (e.g., clover) with regular crops can, in conjunction with contour plowing, reduce soil erosion by 75%.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 177. [2] Easter, K.W. & Cotner, M.L., Evaluation of Current Soil Conservation Strategies, 1982, pp. 283 -- 284.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Control Strategy of Air Quality
Brief Description: Air quality can be bettered by zoning restrictions on the location of nonpolluting uses that contribute indirectly to air pollution problems. Examples include major sports complexes, which generate additional automobile traffic and thus motor vehicle emissions.
Reference: [1] Hagevik, G., Decision Making in Air Pollution Control, 1980, pp. 34 -- 56. [2] Hagevik, G., Mandelker, D.R., & Brail, R.K., Air Quality Management and Land Use Planning, 1974, pp. 89 -- 94.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Control Strategy of Water Pollution
Brief Description: The strategies include setting water quality standards, funding wastewater treatment plant construction, establishing permits system for discharge of waste to waters, certifying water pollution abatement facilities for industry, etc.
Reference: [1] Haskell, E.H. & Price, V.S., State Environmental Management, 1983, pp. 79 -- 81. [2] Imhoff, K. & Fair, G.M., Sewage Treatment, 1980, pp. 209 -- 211. [3] Mancy, K.H., Instrumental Analysis for Water Pollution Control, 1985, pp. 25 -- 32.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Control Techniques of Nonpoint Pollution
Brief Description: There are hard techniques such as check dams, manure storage, barnyard diversions, etc. and soft techniques such as reduced tillage, increased frequency of street sweeping, restricted lawn fertilization, etc..
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 839 -- 843. [2] Paroni, J.L., Handbook of Water Quality Management Planning, 1977, pp. 201 -- 203.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Cost-Saving Approaches for Acquiring Land
Brief Description: The approaches include acquisition at less than fair market value, acquisition through donation or devise (by will), leases, easements, subdivision dedication requirements, and transfer of development rights.
Reference: [1] Field, R.M., State and Local Acquisition of Floodplains and Wetlands, 1981, pp. 45 -- 55. [2] Parsons, K.C., Public Land Acquisition for New Communities and the Control of Urban Growth, 1983, pp. 82 -- 84.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Cost Sharing
Brief Description: Cost sharing arrangements are an incentive for private land owners to adopt pollution abatement measures. Funds for cost sharing programs can come almost entirely from the federal government.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 186 -- 187. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 219 -- 220. [3] Henning, D.H., Environmental Policy and Administration, 1984, pp. 147 -- 148.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: CPU-400 System
Brief Description: CPU-400 is a pilot incinerator system which uses solid waste to generate electricity. A materials recovery system can be incorporated into the process so that in addition to the income from electric power, net operating costs can be reduced.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 62. [2] Holmes, J.R., Refuse Recycling and Recovery, 1981, pp. 105 -- 107. [3] Jackson, F.R., Energy from Solid Waste, 1979, pp. 79 -- 101.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Criteria of Measure Selection
Brief Description: The selection of alternative management measures depends on three interrelated analyses: cost effectiveness, institutional basis and political feasibility.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 200 -- 220. [2] Sewell, G.H., Environmental Quality Management, 1975, pp. 25 -- 26. [3] Patterson, T.A., Land Use Planning: Techniques of Implementation, 1979, pp. 145 - 147.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Critical Area Planting
Brief Description: An erosion control technique. Planting vegetation to stabilize the soil and reduce damage from sediment and runoff to downstream areas.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 153. [2] Haith, D.A. & Raymond, C.L., *Effectiveness of Soil and Water Conservation Practices for Pollution Control*, 1979, pp. 89.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Crop Rotation and Cover Crops
Brief Description: A soil conservation tool. Periodic planting with dense cover crops in rotation or when no crop is being grown can reduce soil erosion.
Reference: [1] Held, R.B. & Clawson, M., *Soil Conservation in Perspective*, 1985, pp. 132 -- 134. [2] Baldwin, J. H., *Environmental Planning and Management*, 1985, pp. 177. [3] Brady, N.C., *Agriculture and the Quality of Our Environment*, 1983, pp. 85 -- 86.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Daly's Model
Brief Description: Daly used a very simple input-output schema to analyze the interrelationships between economic and ecologic activity.
Reference: [1] James, D.E., Jansen, H.M.A. & Opschoor, J.B., *Economic Approaches to Environmental Problems*, 1978, pp. 197 -- 198. [2] Daly, H.E., *Toward a Steady-State Economy*, 1973. [3] Ratcliffe, D.A., *Nature Conservation: Aims, Methods and Achievements*, 1977, pp. 68.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Davenport Land Banking
Brief Description: Davenport, Iowa, allocated funds from its community development grants to acquire land to be used in the future for multifamily housing. Real property acquired are those appropriate for rehabilitation or conservation activities.
Reference: [1] Strong, A.L., *Land Banking*, 1979, pp. 259 -- 260. [2] Flechner, H.L., *Land Banking in the Control of Urban Development*, 1984, pp. 190 -- 191. [3] Seneker, C.J., *Land Use Regulations for Urban Growth Control*, 1984, pp. 145 -- 146.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Debris Basin
Brief Description: An erosion control technique, also called sediment pond. A barrier or dam constructed across a waterway or at other suitable locations to form a silt or sediment basin.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 153. [2] Easter, K.W. & Cotner, M.L., Evaluation of Current Soil Conservation Strategies, 1982, pp. 253 -- 256.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Decision Guides
Brief Description: Decision guides is an important component in an environmental management program, consisting of information on conditions, goals/objectives, selected management targets, land-use plans, and a planned program of intervention measures.
Reference: [1] Henning, D.H., Environmental Policy and Administration, 1984, pp. 81 -- 90. [2] Sewell, G.H., Environmental Quality Management, 1975, pp. 128. [3] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 165 -- 166.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Deferred Grazing
Brief Description: An erosion control technique. Postponing grazing or resting grazing land for a prescribed period to improve hydrologic conditions and reduce soil loss.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 153. [2] Haith, D.A. & Raymond, C.L., Effectiveness of Soil and Water Conservation Practices for Pollution Control, 1979, pp. 49.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Delay Strategy of Stormwater Runoff
Brief Description: Delays of runoff can be realized by temporary storage in detention tanks or sewer systems, diversions, terracing, vegetative cover, check dams, recharge of excess by pressurized injection into aquifers, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 147 -- 148. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 207 -- 210.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Density Regulation Strategy
Brief Description: Development density regulation methods include dimensional controls, floor area ratio system, sky exposure plane, open space area ratio requirement, etc.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 38 -- 40. [2] Bronestein, D.A., Land Use Regulation: Construction Permits, 1977, pp. 47 -- 49. [3] Kusler, J.A., Regulating Sensitive Lands, 1980, pp. 90 -- 91.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Deposit System
Brief Description: A deposit system, reinforced by the emphasis upon litter control, can be employed to encourage the return of the bottles and maintain their velocity of circulation.
Reference: [1] Hines, L.G., Environmental Issues, 1983, pp. 303 - 305. [2] Jackson, F.R., Recovering and Reclaiming of Municipal Solid Wastes, 1985, pp. 239 -- 240. [3] Diaz, L.F., Resource Recovery from Municipal Solid Wastes, 1982, pp. 72 -- 75.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Desalination System
Brief Description: A desalination process often utilizes the phase change in water, surface properties of membranes, or ion-selective properties of solids (ion exchange) to realize saline-water conversion. A desalination consists of three subsystems.
Reference: [1] Mather, J.R., Water Resources, 1984, pp. 207 -- 221. [2] Howe, E.D., Fundamentals of Water Desalination, 1984. [3] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 252 -- 254.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Destructive Distillation
Brief Description: This innovative solid waste management method is a chemical conversion process in which refuse is treated at high temperatures and the remaining organic matter is distilled to approximately equal percentages of gases, liquids, and solids.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 81 -- 82. [2] Stirrup, F.L., Public Cleansing: Refuse Disposal, 1975, pp. 72 -- 73. [3] Hershkowitz, A., Garbage: Practices, Problems and Remedies, 1988.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Detention Basin
Brief Description: Detention basins are designed to reduce both peak and total discharge of stormwater and to settle out various pollutants. They can serve dual purposes as stormwater management structures and recreational facilities or residential amenities.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 48. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 53 -- 54.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Development Planning Strategy
Brief Description: In order for the development to conform to the capacities of the land, a complete site analysis and an ecological plan are required using information on soil properties and site characteristics (bedrock, slope, surface drainage, vegetation, scenery, etc.)
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 491 -- 493. [2] Peterson, G.E. & Yampolsky, H., Urban Development and the Protection of Metropolitan Farmland, 1985, pp. 257 -- 260.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Dimensional Control
Brief Description: A traditional zoning technique that specifies the height, minimum depth of side, front and back yards, minimum lot size and frontage, and percentage of the lot to be left unbuilt upon.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 38. [2] Chapin, F.Jr., Urban Land Use Planning, 2d. ed., 1975, pp. 274 -- 275. [3] Bronstein, D.A., Land Use Regulation: Construction Permits, 1977, pp. 92 -- 94.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Disposal System Maintenance
Brief Description: Maintenance services of on-site disposal systems include: periodic inspections, septate pumping, equipment repair, absorption field repair and replacement, grounds maintenance, and system change or alteration.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 186 -- 187. [2] Weiss, S., Sanitary Landfill Technology, 1984, pp. 136 -- 138.
Key Words: Mattter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Diversion
Brief Description: A channel with a supporting ridge on the lower side constructed across the slope to divert water and help control soil erosion and runoff. This is also a good management practice for controlling nonpoint pollution from rural land uses.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 153. [2] Haith, D.A. & Raymond, C.L., *Effectiveness of Soil and Water Conservation Practices for Pollution Control*, 1979, pp. 76.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Diversity Preservation
Brief Description: High levels of genetic diversity or variety help to maintain ecological stability. Diversity is a valuable resource that can be nonrenewable and is worth preserving.
Reference: [1] Mather, A. S., *Land Use*, 1986, pp. 208 -- 210. [2] Watt, K. E. F., *Understanding the Environment*, 1982, pp. 75. [3] Keyes, D.L., *Land Development and the Natural Environment: Estimating Impacts*, 1975, pp. 35 - 36.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Drainage Control Strategy
Brief Description: Drainage control can be assured through requirements for drainage easements, proper grading, on-site retention or detention of runoff, and improved drainage ways.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 175. [2] Imhoff, K., *Handbook of Urban Drainage and Sewage Disposal*, 4th ed, 1989, pp. 153 -- 167.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Drinking Water Pollution Sources
Brief Description: The leading sources polluting drinking water supplies are cultivated cropland, forest activities, stormwater runoff from urban and industrial areas, septic tanks, feedlots, municipal wastewater treatment plant discharges, large dairy operations, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 37 -- 39. [2] Tourbier, J.T. & Westmacott, R., *Water Resources Protection Technology*, 1981, pp. 5 --6.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Dunbar's Recommendations
Brief Description: Economist John O. Dunbar has discussed tactics that may be of value in gaining public acceptance for projects involving the recycling of waste materials to the land, for example, involve the people in the decision-making process, etc.
Reference: [1] Fainstein, S.S., Fainstein, N.I., & Armstrong, P.I., *Restructuring the City*, 1986, pp. 63 -- 64. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., *Planning the Uses and Management of Land*, pp. 527. [3] Kotler, M., *Neighborhood Government*, 1977, pp. 42.
Key Words: Active/Passive, Affiliative/Introverted
Subject: Public Participation

Title: Ecological Carrying Capacity
Brief Description: Establishment of ecological carrying capacities for recreation uses involves the evaluation of site degradation, environmental hazards to recreationists, maintenance/ enhancement of site qualities, and characteristics favorable for different recreational uses.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., *Planning the Uses and Management of Land*, 1978, pp. 349 -- 350. [2] Keyes, D.L., *Land Development and the Natural Environment: Estimating Impacts*, 1975, pp. 135 -- 136.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Ecological Evaluation
Brief Description: As a part of environmental impact assessment, it can be carried out by using 8 techniques: east Hampshire, west Sussex, evaluations based on higher plant species rarity, evaluations based on indicator species, etc.
Reference: [1] Lovejoy, D., *Land Use and Landscape Planning*, 1979, pp. 72 -- 82. [2] Zube, E.H., Bruth, R.O., & Fabos, J.G., *Landscape Assessment: Values, Perceptions, and Resources*, 1987, pp. 151 -- 167.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Ecological Impacts
Brief Description: Ecological impacts are associated with physical destruction of habitats, air pollution, water pollution, noise pollution, groundwater changes, erosion, stream flow changes, recreation pressure, management changes, etc.
Reference: [1] Lovejoy, D., *Land Use and Landscape Planning*, 1979, pp. 78. [2] Dasmann, R., *Environmental Conservation*, 1976, pp. 4.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Economic-Ecologic Modelling
Brief Description: Economic-ecologic modelling concerns how to optimally exploit natural ecosystems and at the same time preserve them in steady-state form so as to maximize net social benefits.
Reference: [1] James, D.E., Jansen, H.M.A. & Opschoor, J.B., Economic Approaches to Environmental Problems, 1978, pp. 196 -- 205. [2] Isard, W., On the Linkage of Socio-Economic and Ecological Systems, 1968.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Effluent Charges
Brief Description: Effluent charges refer to taxes on the volume of effluent discharged per unit time. They are aimed at achieving ambient environmental quality standards at minimum cost.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 132. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 3 -- 4. [3] Roos, L.L.Jr. & Roos N.R., Pollution, Regulation and Evaluation, 1981, pp. 11 -- 12.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Electoral Land Use Planning
Brief Description: The use of the initiative and referendum in local land use planning matters, such as creating a buffer zone or allowing rental apartments in a single-family zones, is termed electoral land use planning or lallot box planning.
Reference: [1] Caves, R.W., Land Use Planning, 1992, pp. 28 -- 51. [2] Fainstein, S.S., Fainstein, N.I., & Armstrong, P.I., Restructuring the City, 1986, pp. 25 -- 26. [3] Kotler, M., Neighborhood Government, 1977, pp. 3 -- 4.
Key Words: Active/Passive, Affiliative/Introverted
Subject: Public Participation

Title: Emission Allocation Procedure
Brief Description: The emission allocation procedure consists 6 steps and utilizes existing plans, air quality standards, and emission inventories to integrate air quality considerations into the land use planning process.
Reference: [1] Hagevik, G. & Mandelker, D.R., Air Quality Management and Land Use Planning, 1974, pp. 276 -- 279. [2] Hagevik, G., Decision Making in Air Pollution Control, 1980, pp. 32 -- 42. [3] Tebbens, B.D., Air Pollution, 1978, pp. 264 -- 267.
Key Words: Organized/Chaotic, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Emissions Control
Brief Description: Emissions control strategies include afterburners, settling chambers, cyclone precipitators, baghouse filters, wet scrubbers, electrostatic, etc.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 159 -- 160. [2] Esposito, J.C., Vanishing Air, 1980, pp. 41 -- 42. [3] Tebbens, B.D., Air Pollution, 1978, p. 63 -- 67.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Emissions Estimates Strategy
Brief Description: Data on emissions can be obtained from the EPA, state management agencies, major offenders, building inspectors, fuel dealers, utility officials, traffic departments, citizen groups, or direct measurement of point and nonpoint sources.
Reference: [1] Suess, M.J. & Craxford, S.R., Manual on Urban Air Quality Management, 1976, pp. 219 -- 224. [2] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 137 -- 138. [3] Mowli, P.P. & Subbaya, V.V., Air Pollution & Control, 1988, pp. 176.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Emission Standards Approach
Brief Description: A popular pollution source control strategy. The community establishes emission standards that deal with the technical capacity of desired industries to meet a specified nuisance output.
Reference: [1] Hagevik, G. & Mandelker, D.R., Air Quality Management and Land Use Planning, 1984, pp. 170 -- 180. [2] Friedlaender, A.F., Approaches to Controlling Air Pollution, 1978, pp. 133 -- 134. [3]
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Endangered Species Management
Brief Description: Activities in management of endangered species include: maintenance and development of proper habitat, captive breeding, double clutching, cross-fostering, surrogate species, and habitat acquisition.
Reference: [1] Anon, A., Endangered and Threatened Wildlife and Plants, 1982. [2] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 412 -- 416. [3] Gabrielson, I.N., Wildlife Conservation, 1973, pp. 267 -- 283.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: ENDEX System
Brief Description: The ENDEX system is an automated, documented, and comprehensive index describing environmental data collections. Users can search ENDEX data bases interactively with their terminals by special arrangement with the Data Index Branch in EDS.
Reference: [1] Warner, L. & Preston, E., A Review of Environmental Impact Assessment Methodologies, 1984, pp. 2. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 126 -- 127.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Energy Flow Matrices
Brief Description: Energy flow matrices are compartment models set up as flow diagrams or energy balance sheets, in which structural analysis can be adopted in examining the circulation of materials, especially pollutants, throughout ecosystems.
Reference: [1] James, D.E., Jansen, H.M.A. & Opschoor, J.B., Economic Approaches to Environmental Problems, 1978, pp. 203 -- 207. [2] Watt, K.E.F., Systems Analysis in Ecology, 1976. [3] Atkins, G.L., Multicompartment Models for Biological Systems, 1979.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Environmental Constraint Zoning
Brief Description: Specified applications of environmental constraint zoning include agriculture zoning, floodplain zoning, conservation zoning, performance or impact zoning.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 199 -- 200. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 94 -- 97.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Environmental Degradation
Brief Description: Indicators of environmental degradation includes erosion of top quality agricultural soil, deforestation on a watershed, reduction in the species diversity in a community, etc..
Reference: [1] Watt, K.E.F., Understanding the Environment, 1982, pp. 268 -- 269. [2] Dasmann, R., Environmental Conservation, 1976, pp. 76 -- 77. [3] Keyes, D.L., Land Development and the Natural Environment: Estimating Impacts, 1975, pp. 135 -- 136.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Environmental Evaluation System (EES)
Brief Description: As an environmental impact analysis method, EES is based on a checklist of 78 environmental and socio-economic parameters, each represented by a numerical value. Parameter estimates can be converted into environmental quality scores.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 64 -- 68. [2] Roberts, R.D., Planning and Ecology, 1984, pp. 90 -- 92. [3] Munn, K.H., Environmental Impact Assessment, 2nd ed., 1979, pp. 145 -- 147.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Environmental Monitoring
Brief Description: Essential aspects of the environment, such as river flow, air quality, and diseases, must be surveyed on a regular basis. The surveys yield data that are used to identify trends and thus to make projections and forecasts.
Reference: [1] Catanese, A. C. & Snyder, J. C., Urban Planning, 1988, pp. 286. [2] Tourbier, J.T. & Westmacott, R., Water Resources Protection Technology, 1981, pp. 30 -- 31. [2] Dasmann, R., Environmental Conservation, 1976, pp. 45 -- 46.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Environmental Planning Process
Brief Description: The process for developing an environmental management program consists of 5 basic steps: problem analysis, direction setting, specification of land use and physical control measures, design and implementation, monitoring and evaluation.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 81 -- 107. [2] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 20 -- 23.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Environmental Problem Analysis
Brief Description: The basic elements in environmental problem analysis are: scoping, natural process analysis, activity analysis, pollutant analysis, exposure analysis, management strategies analysis, post-generation control analysis, etc.
Reference: [1] Dee, N., Environmental Evaluation System for Water Resource Planning, 1982, pp. 284 -- 285. [2] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 86 -- 94.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Environment Inventory
Brief Description: The nine components of the inventory of the natural and man-made environment are air/climate, topography, geology/soils, vegetation, water resources, domestic/wild animals, fire, factors limiting resource use, and developments/facilities/ services.
Reference: [1] Herr,P., Slater,G., & Bluhm,R., Evaluating Development Impacts, 1978, pp. 61 -- 62. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 52 -- 53.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Erosion Control Measures
Brief Description: Erosion control measures include sediment retention basins and holding ponds, terraces and diversions, mulches, vegetation, chemical stabilizers, changing the contour, etc.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, pp. 864 -- 865. [2] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 124 - - 125.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Erosion Control of Construction Site
Brief Description: Good management tools of construction sites aimed at erosion control include: appropriate phasing of grading and clearing, road alignment, providing temporary runoff diversions and chutes, slope configuration and modifications, mulching, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 146. [2] Viessman,W.Jr. & Welty,C., Water management, 1985, pp. 555.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Erosion-Control Plants
Brief Description: Grasses, several legume species, several tree species, and various shrubs are well suited for stabilizing disturbed areas.
Reference: [1] Davidson,D.A., Soils and Land Use Planning, 1980, pp. 260 -- 263. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 866 -- 868.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Erosion Reduction by Vegetation
Brief Description: A good vegetative cover will reduce erosion by reducing the rain-drop impact, decreasing runoff velocity, binding soil particles by the plant roots, increasing water infiltration, and reducing soil moisture, which increases storage capacity.
Reference: [1] Brown, W.M., Hines, W.G., Rickett, D.A., & Beach, G.L., A Synoptic Approach for Analyzing Erosion as a Guide to Land-Use Planning, 1979, pp. 342 -- 344. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 865 -- 866.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Erosion/Sedimentation Control Plan
Brief Description: The plan calls for stream-crossing installations; sediment and settlement basins; trees within 10 feet of stream cut; idle, disturbed areas mulched; diversions for control of surface water; and areas stripped of vegetation reseeded as soon as possible; etc.
Reference: [1] Leonard, P., Management Agreements: A Tool for Conservation, 1983, pp. 351 -- 360. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, pp. 495.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: East Hampshire Method
Brief Description: This technique is the first attempt to produce a structured ecological evaluation for planning purposes. In this method, the study area is divided into a number of zones of different ecological value according to the presence of 3 vegetation types.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 72 -- 73. [2] Warner, L. & Preston, E., A Review of Environmental Impact Assessment Methodologies, 1984, pp. 260 -- 262.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Eutrophication Control
Brief Description: Various methods are used to realize eutrophication control and improve lake water quality, including reducing siltation, minimizing the fertilizer content reaching the water, improving the ground cover on the drainage area, etc.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 257 -- 259. [2] Tourbier, J.T. & Westmacott, R., Water Resources Protection Technology, 1981, pp. 246 -- 250. [3] Cadieux, C.L., Wildlife Management on Your Land, 1985, pp. 203.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Exposure Estimates Strategy
Brief Description: Estimates of exposure are most important in defining pollution problems and can be made by sampling and analyzing the chemical composition of the ambient environment.
Reference: [1] Baldwin, J.H., Environmental Planning and Management, 1985, pp. 138. [3] Hagevik, G., The Relationship of Land Use and Transportation Planning to Air Quality Management, 1982, pp. 224 -- 225.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Fairfax Revolving Fund
Brief Description: Fairfax County, VA, created a \$500,000 revolving fund for its land banking program to buy critical sites so that the county can profit from publicly caused increases in land values and the desired mix of development can be assured upon sale of the sites.
Reference: [1] Strong, A.L., Land Banking, 1979, pp. 259. [2] Flechner, H.L., Land Banking in the Control of Urban Development, 1984, pp. 320 -- 330. [3] Seneker, C.J., Land Use Regulations for Urban Growth Control, 1984, pp. 239 -- 248.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Farm Pond
Brief Description: Properly designed, properly constructed, properly managed, the farm pond can improve the lot of wildlife significantly. A successful farm pond is a grouping of soil, plants, fish, birds, and animals combining to form a complete ecosystem.
Reference: [1] Cadieux, C.L., Wildlife Management on Your Land, 1985, pp. 197 -- 203. [2] NWF, Gardening with Wildlife, 1974, pp. 198 -- 205. [3] Burger, G.V., Practical Wildlife Management, 1990, pp. 134 -- 150.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Feasibility Analysis of Environmental Programs
Brief Description: Environmental program officials must choose a course of action which will: technically accomplish the goals of the program in an efficient manner, garner sufficient political support to be enacted, and survive possible court challenges.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 196. [2] Henning, D.H., Environmental Policy and Administration, 1984, pp. 295 -- 298.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Feedlot Waste Disposal
Brief Description: Feedlot production of livestock creates serious disposal problems. The burden of feedlot animal pollution upon waters is substantially greater than that of the municipal/human waste load. There are several practical disposal methods available.
Reference: [1] Hines, L.G., Environmental Issues, 1983, pp. 219 - 221, 291. [2] William, S., Third Pollution: Problem of Solid Waste Disposal, 1975, pp. 283 -- 288. [3] Goldman, M.I., Controlling Pollution, 1977, pp. 213 -- 215.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Field Border
Brief Description: Also called filter strip. A border or strip of permanent vegetation established as field edges to control soil erosion. This is also a good management practice for controlling nonpoint pollution from rural land uses.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 153. [2] Brown, W.M., Hines, W.G., Rickett, D.A., & Beach, G.L., A Synoptic Approach for Analyzing Erosion as a Guide to Land-Use Planning, 1979, pp. 342 -- 344.
Key Words: Wealthy/Poor, Stable/Unstable
Subject: Soil Conservation

Title: Filtration Devices
Brief Description: Various filtration devices, such as the use of straw or hay bales and storm drain filters during construction, can help reduce peak discharges and trap sediments.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 48 -- 49. [2] Easter, K.W. & Cotner, M.L., Evaluation of Current Soil Conservation Strategies, 1982, pp. 284 -- 286.
Key Words: Wealthy/Poor, Stable/Unstable
Subject: Soil Conservation

Title: Fire Prevention In Landfills
Brief Description: Fire prevention in a sanitary landfill is facilitated by earthen barriers (they are effective firewalls). Various cover substitutes include crushed stone, fly ash, mine waste, and cinders.
Reference: [1] Herriman, R.C., Soil and Landscape Factors in Siting Sanitary Landfills, 1982, pp. 78 -- 80. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 126 -- 127.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Fish Cover Development
Brief Description: Structures constructed in lakes and streams to improve fish habitat by altering stream velocity and depth or to provide physical cover for fish. Examples include regulating dams and log check dams in streams, and fish shelters in lakes.
Reference: [1] US Dept of Agriculture, Wildlife and Fish Habitat Management in the Forest Service, 1983, pp. 127. [2] Burger,G.V., Practical Wildlife Management, 1990, pp. 179 -- 180. [3] Cadieux,C.L., Wildlife Management on Your Land, 1985, pp. 204.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Fishery Habitat Improvement
Brief Description: Activities aimed at increasing the capability of lakes/streams to support fish populations include: installation of channel structures to aid pool development, removal barriers to fish movement, development of spawning facilities, etc.
Reference: [1] US Dept of Agriculture, Wildlife and Fish Habitat Management in the Forest Service, 1983, pp. 11-- 15. [2] Heintzelman,D., The Wildlife Protectors Handbook, 1992, pp. 128 -- 133. [3] Giles,R., Wildlife Management Techniques, 1990, pp. 172 -- 175.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Fish Pond Management
Brief Description: Best management practices for a fish pond include: plant trees and bushes to form a windbreak; plant the basin scooped out to form a reservoir; plant a buffer zone all around the drainage area of the reservoir; and plant some fence posts.
Reference: [1] Cadieux,C.L., Wildlife Management on Your Land, 1985, pp. 197 -- 203. [2] Burger,G.V., Practical Wildlife Management, 1990, pp. 134 -- 150. [3] Robinson,W.L. & Bolen,E.G., Wildlife Ecology and Management, 1984, pp. 506 -- 517.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Flakt RRR System
Brief Description: An innovative system in Swede aimed at recovery of paper, cardboard, and ferrous metals together with other usable materials from municipal solid wastes.
Reference: [1] Holmes,J.R., Refuse Recycling and Recovery, 1981, pp. 106 -- 116. [2] Ryding,S.O., Environmental Management Handbook, 1992, pp. 362 -- 363. [3] Jackson,F.R., Recycling and Reclaiming of Municipal Solid Wastes, 1975, pp. 279 -- 280.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Floating Zone
Brief Description: An innovative zoning device. It is a combination of the special-use district and the special-use permit procedure. The planning authority sets the standards for a certain type of development but leaves the actual location of such uses to private initiative.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 47. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 214 -- 219.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Floodplain Acquisition Decision-Making
Brief Description: The checklist is: meeting floodplain management objectives, meeting additional community objectives, legal authority, present ownership and value, community and landowners support, availability of funding, reuse of acquired property, and implementation.
Reference: [1] Field, R.M., State and Local Acquisition of Floodplains and Wetlands, 1981, pp. 22 -- 23. [2] Platt, R.H., McMuller, M.G., Paton, R., Patton, A., & Grahek, M., Intergovernmental management of Floodplains, 1984, pp. 410 -- 413.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Floodplain Management Tools
Brief Description: Regulations and development policies, floodplain acquisition, floodproofing, flood forecasting/warning systems, flood control measures (dams, reservoirs, channel alternations, land treatment, etc.), measures to lessen the impact of flooding.
Reference: [1] Field, R.M., State and Local Acquisition of Floodplains and Wetlands, 1981, pp. 16 -- 27. [2] Platt, R.H., McMuller, M.G., Paton, R., Patton, A., & Grahek, M., Intergovernmental management of Floodplains, 1984, pp. 390 -- 395.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Floodplain Regulations
Brief Description: Floodplain regulations guide the use and development in flood-prone areas through the application of zoning, subdivision regulations, building codes, health regulations, tax adjustments, open space reservation, warning signs, etc.
Reference: [1] Platt, R.H., McMuller, M.G., Paton, R., Patton, A., & Grahek, M., Intergovernmental Management of Floodplains, 1984, pp. 253 -- 255.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Floodplain Reservation
Brief Description: Floodplain serves to clean water and air through the various types of plants, etc., that exist there naturally, contributing substantially to the health and well-being of the public and therefore should remain undeveloped in the public interest.
Reference: [1] Lemay, J. & Harrison, E., Environmental Landuse Problems, 1984, pp. 52 -- 53. [2] Valsin, R.D., Protection of Sensitive lands, 1976, pp. 201 -- 214.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Floor Area Ratio Device
Brief Description: An innovative zoning technique. The floor area ratio is the ratio between the total floor area of the building and the ground area of the site. This method allows greater latitude in design and layout.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1962, pp. 38 -- 39. [2] Bronestein, D.A., Land Use Regulation: Construction Permits, 1977, pp. 226 -- 224. [3] Kusler, J.A., Regulating Sensitive lands, 1980, pp. 193 -- 195.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Fluidized-Bed Incineration
Brief Description: An innovative incineration system to overcome air pollution problem. Forced air suspends a hot bed of materials that engulfs and burns injected particles of waste.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 206. [2] Weiss, S., Sanitary Landfill Technology, 1984, pp. 165 -- 167. [3] Goldman, M.I., Controlling Pollution, 1977, pp. 272 -- 275.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Forage Crops Insertion
Brief Description: A soil conservation tool. Soil organic matter and soil physical properties could be improved by inserting forage crops in a rotation of row crops, and erosion losses would thereby be reduced, but farm income would be adversely affected.
Reference: [1] Mather, A. S., Land Use, 1986, pp. 200. [2] Brown, W.M., Hines, W.G., Rickett, D.A., & Beach, G.L., A Synoptic Approach for Analyzing Erosion as a Guide to Land-Use Planning, 1979, pp. 359 -- 360.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Forest Management Strategy
Brief Description: The types of forest management include: selection and regeneration, clear felling, group felling, overstories on felled areas, treatment of old forests, etc.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 144 -- 146. [2] Davis, K.P., Forest Management: Regulation and Evaluation, 1976, pp. 286 -- 302. [3] Blacksell, M., Landscape Protection and Development Control, 1979, pp. 267 -- 274.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Framework of Watershed Management
Brief Description: The watershed management framework is composed by: direction setting, in the form of setting goals and formulating management principles; target setting; and specifying the appropriate uses and practices in the watershed.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 161. [2] Skidmore, O. & Merrill, M.Y., Assessment and Recommendations for Community Water Resources Planning, 1980, pp. 126 -- 129.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Game Management
Brief Description: Game management is the art of making land produce sustained annual crops of wild game for recreational use, including restriction of hunting, predator control, reservations of game lands, artificial replenishment, and environmental controls.
Reference: [1] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 3 -- 5. [2] Gabrielson, I.N., Wildlife Conservation, 1973, pp. 42 -- 44. [3] Leopold, A., Game Management, 1933, pp. 3 -- 47.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Geographic Information System
Brief Description: Geographic information system (GIS) is very useful to decision makers in wildlife planning, management, and research. It is a collection of data (on vegetation, whether patterns, soils, topography, etc), often in a form of computerized maps.
Reference: [1] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 216. [2] Crowe, D.M., Comprehensive Planning for Wildlife Resources, 1983, pp. 369 -- 377. [3] Gabrielson, I.N., Wildlife Conservation, 1973, pp. 147 -- 148.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Grade Stabilization Structure
Brief Description: A structure to stabilize the grade or control erosion in natural or artificial channels. This is also a good management practice for controlling nonpoint pollution from rural land uses.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 153. [2] Haith, D.A. & Raymond, C.L., *Effectiveness of Soil and Water Conservation Practices for Pollution Control*, 1979, pp. 123.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Graduated Noncompliance Fee
Brief Description: This fee is imposed for discharges above the levels permitted. Such a system provides a discrete graduated penalty for noncompliance, is relatively easy to implement and administer, and provides incentives to minimize costs and stimulates innovation.
Reference: [1] Baldwin, J. H., *Environmental Planning and Management*, 1985, pp. 135 -- 136. [2] Hagevik, G., *The Relationship of Land Use and Transportation Planning to Air Quality Management*, 1982, pp. 245 -- 249.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Grassed Waterway / Outlet
Brief Description: A natural or constructed waterway or outlet shaped and established in vegetation to safely dispose of water and runoff in order to prevent soil erosion.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 153. [2] U.S. SCS, *Potential Best Management Practices to Control Sediment Non-Point Source Pollution from Agricultural Land in North Carolina*, 1978, pp. 14 -- 16.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Grazing System Management
Brief Description: Management practices in intensive grazing systems include: harrowing, fencing, manuring, mowing for hay, sprinkler irrigation, and shifting of cattle (to prevent overgrazing).
Reference: [1] Vink, A.P.A., *Landscape Ecology and Land Use*, 1981, pp. 127 -- 128. [2] Flawn, P.T., *Environmental Geology*, 1980, pp. 284 -- 286. [3] Clapham, W.B., *Natural Ecosystems*, 1983.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Groundwater Treatment
Brief Description: The types of treatment used in public water supplies from groundwater include: chlorination, sedimentation/coagulation, rapid sand filtration, iron/manganese removal, softening by lime, etc.
Reference: [1] Lamb, J.C., Water Quality and its Control, 1985, pp. 246. [2] Durfor, C.N. & Becker, E., Public Water Supplies of the 100 Largest Cities in the United States, 1984. [3] Canter, L.W. & Knox, R.C., Groundwater Pollution Control, 1985.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Growth / Development Phasing
Brief Description: This technique is for municipalities to control land use, facilitate orderly growth, and protect the environment through the location of and access to public facilities. It is also a no-growth weapon.
Reference: [1] Caves, R.W., Land Use Planning, 1992, pp. 32. [2] Flechner, H.L., Land Banking in the Control of Urban Development, 1984, pp. 244 -- 249. [3] Seneker, C.J., Land Use Regulations for Urban Growth Control, 1984, pp. 197 -- 200.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Growth Management Strategy
Brief Description: Growth management/control tools include identifying growth zones; using utility extensions (water, sewerage, gas, electricity); controlling over school facilities, parks, roads, and services; etc.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 36 -- 39. [2] Seneker, C.J., Land Use Regulations for Urban Growth Control, 1984, pp. 275 -- 280.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Guidance System Approach
Brief Description: The general framework encompassing such devices as the location of public services (for example, water and sewers, highways and transit lines) for shaping the structure of a metropolitan region is called a "urban development guidance system".
Reference: [1] Hagevik, G. & Mandelker, D.R., Air Quality Management and Land Use Planning, 1984, pp. 209 -- 213. [2] Davidson, D.A., Soils and Land use Planning, 1980, pp. 182 -- 183.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Guidelines of Watershed Management
Brief Description: Guidelines to follow in formulating local ordinances for water supply watersheds include: site-fitting development, protecting existing cover, protecting critical areas, stabilizing disturbed areas, minimizing runoff, retaining sediment, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 176. [2] Schwartz, S.I., Johnston, R.A., Blackmarr, J.R., & Hansen, D.E., Controlling Land Use for Water Management and Urban Growth Management, 1979, pp. 320 -- 323.
Key Words: Stable/unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Habitat Access Management
Brief Description: This activity involves the management of human and/or vehicular access to key habitats for the purpose of benefiting wildlife and fisheries. It includes acres of wildlife habitat where human access is prohibited or restricted by official area closure orders.
Reference: [1] US Dept of Agriculture, Wildlife and Fish Habitat Management in the Forest Service, 1983, pp. 127. [2] Burger, G.V., Practical Wildlife Management, 1990, pp. 219 -- 220.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Habitat Classification System
Brief Description: Habitat classification systems provide opportunities for managers to evaluate habitat changes and make plans to preserve an area. Examples include: Kuchler's Potential Natural Vegetation, Ecoregion, National Wetlands Habitat Classification, and Aviregions.
Reference: [1] Billings, W.D., Plants and the Ecosystem, 1975. [2] Thomas, J.W., Wildlife Habitats on Managed Forests of the Blue Mountains of Oregon and Washington, 1979, pp. 176. [2] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 129 -- 135.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Habitat Development for Deer
Brief Description: The best management tools to improve deer habitats include: proper management of woodlot, plantings of conifers to provide dense winter cover, production lush second-growth vegetation by selective clear-cutting or burning, etc.
Reference: [1] Cadieux, C.L., Wildlife Management on Your Land, 1985, pp. 212 -- 234. [2] Burger, G.V., Practical Wildlife Management, 1990, pp. 165 -- 170.
Key Words: Natural/Artificial, Stable/unstable
Subject: Ecological Protection

Title: Habitat Improvement for Big Game
Brief Description: A habitat-maintenance or habitat-enhancement program often contains: range improvement by chemical means, burning / mechanical control (to promote greater grass cover), range sites fertilization, and proper grazing management.
Reference: [1] Anderson, S.H., *Managing our Wildlife Resources*, 2nd ed., 1991, pp. 279. [2] Crowe, D.M., *Comprehensive Planning for Wildlife Resources*, 1983, pp. 226 -- 237. [3] Gabrielson, I.N., *Wildlife Conservation*, 1983, pp. 105 -- 108.
Key Words: Natural/Artificial, Stable/unstable
Subject: Ecological Protection

Title: Habitat Management for Rabbits
Brief Description: The methods to improve rabbit habitat include: providing required escape cover such as brush piles, gullies, a weedy fence row where the fencing job is done by thick cover, etc.
Reference: [1] Cadieux, C.L., *Wildlife Management on your Land*, 1985, pp. 148 -- 151. [2] NWF, *Gardening with Wildlife*, 1984, pp. 199 -- 200. [3] Burger, G.V., *Practical Wildlife Management*, 1990, pp. 151 -- 152.
Key Words: Natural/Artificial, Stable/unstable
Subject: Ecological Protection

Title: Habitat Modelling
Brief Description: Habitat modelling is a way of examining wildlife habitat requirements and assessing habitat suitability. Once factors of the habitat necessary for the support of a population have been identified, communities can be classified as suitable for desired species.
Reference: [1] Billings, W.D., *Plants and the Ecosystem*, 1975, pp. 78 -- 85. [2] Anderson, S.H., *Managing our Wildlife Resources*, 2nd ed., 1991, pp. 89. [3] Nichols, J.D., Hensler, G.L., and Sykes, P.W., *Ecological Modeling*, 1980, pp. 215 -- 232.
Key Words: Natural/Artificial, Stable/unstable
Subject: Ecological Protection

Title: Habitat Preservation for Birds
Brief Description: The strategies for preserving birds habitats include: growing small grains / safflowers close to colonial nesting sites, providing water in otherwise completely dry areas, preservation of trees and shrubs for nesting cover, preventing grass fires, etc.
Reference: [1] Burger, G.V., *Practical Wildlife Management*, 1990, pp. 262-- 276. [2] Cadieux, C.L., *Wildlife Management on your Land*, 1985, pp. 81 -- 98. [3] NWF, *Gardening with Wildlife*, 1974, pp. 248 -- 257.
Key Words: Natural/Artificial, Stable/unstable
Subject: Ecological Protection

Title: Heliwell Method
Brief Description: Heliwell developed an ecological evaluation technique based on botanical surveys. The technique can be used either for assessing large areas from existing floral records or for assessing individual sites.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 76 -- 77. [2] Dasmann, R., Environmental Conservation, 1976, pp. 95 -- 97. [3] Keyes, D.L., Land Development and the Natural Environment: Estimating Impacts, 1975, pp. 285 -- 186.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: High Point Land Banking
Brief Description: High Point, a town in NC, has a private, nonprofit housing development corporation that buys land to hold for future development for low and moderate income housing.
Reference: [1] Strong, A.L., Land Banking, 1979, pp. 259 -- 260. [2] Flechner, H.L., Land Banking in the Control of Urban Development, 1984, pp. 204 -- 206. [3] Seneker, C.J., Land Use Regulations for Urban Growth Control, 1984, pp. 159 -- 162.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: High Temperature Incineration
Brief Description: An innovative incineration system to overcome air pollution problem. Wastes are burned at temperature higher than 300 F, which promotes rapid and complete combustion.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 206. [2] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 83 -- 84. [3] Frey, D.N., Policies for Solid Waste Management, 1980, pp. 173 -- 177.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: High-Yield Pollutant Sources
Brief Description: High-yield pollutant sources include some types of industrial/commercial activities, land fills, wastewater treatment plants, feedlots, and food processing plants.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 137. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 133 -- 134. [3] Roos, L.L. Jr. & Roos, N.R., Pollution, Regulation and Evaluation, 1981.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Holistic Landscape Survey
Brief Description: A holistic landscape survey, also called landscape ecological survey, collects data on the visual characteristic, soil profiles, component structures, and materials and organisms in order to identify complete ecosystems.
Reference: [1] Vink, A.P.A., Landscape Ecology and Land Use, 1981, pp. 76 -- 77. [2] Eyre, S.R., Vegetation and Soils, 1978, pp. 328 -- 329. [3] Fabos, J.G. & Caswell, S.J., Composite Landscape Assessment, 1977, pp. 264 -- 265.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Hydrologic Process Control
Brief Description: Control of hydrologic processes is by controlling increases in runoff and decreases in infiltration, protecting existing water courses from encroachment and alteration, stabilizing channels and banks, and reducing stormwater runoff pollution.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 147 -- 148. [2] Imhoff, K. & Fair, G.M., Sewage Treatment, 1980, pp. 152 -- 158. [3] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 329 -- 331.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Impact Zoning
Brief Description: Impact zoning permits a wide range of development types so long as they satisfy numerous standards intended to prevent violation of environmental (and other) constraints.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 199. [2] Hagevik, G. & Mandelker, D.R., Air Quality Management and Land Use Planning, 1974, pp. 167 -- 180. [3] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 174.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Implementation Planning Program (IIP)
Brief Description: The IIP model is used to evaluate the effectiveness of alternative air-pollution control strategies for a region. The heart of the IIP is an atmosphere diffusion model, which predicts ambient concentrations of pollution from sources.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 128 -- 133. [2] Esposito, J.C., Vanishing Air, 1980, pp. 132.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Improper Landfill Placement
Brief Description: When a landfill has been placed over a marsh, the leachate will contaminate the underground areas for many decades to come. When a landfill has been placed over a floodplain, the filling will have an adverse effect on future floods.
Reference: [1] Lemay, J. & Harrison, E., Environmental Landuse Problems, 1984, pp. 49 -- 51. [2] Herriman R.C., Soil and Landscape Factors in Siting Sanitary Landfills, 1982, pp. 211 -- 214.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Improvement of Water Use Efficiency
Brief Description: Mechanisms that can be used to encourage greater water use efficiency include: marketing more efficient devices for using water in homes and industries, limiting funding for construction of new water resources facilities, initiating education programs, etc.
Reference: [1] Viessman, W. Jr. & Welty, C., Water Management, 1985, pp. 114 -- 115. [2] James, L.D. & Lee, R.R., Economics of Water Resources Planning, 1981, pp. 278 -- 279. [3] Clark, J.W., Water Supply and Pollution Control, 3d ed., 1977, pp. 163.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Indirect Habitat Improvements
Brief Description: These are accomplishments through support that are reported in the other resource elements. They may include determining mitigation and compensation needs for other resource projects, providing streamside protection needs for fish habitats, etc.
Reference: [1] US Dept of Agriculture, Wildlife and Fish Habitat Management in the Forest Service, 1983, pp. 19-- 22. [2] Giles, R., Wildlife Management Techniques, 1990, pp. 188 -- 191.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Individual Mallard Treatments
Brief Description: In a mallard management plan, individual treatments may include: land purchase for waterfowl production, wetland easement purchase, lease of upland for waterfowl management, cropland retirement, use of nest baskets, delayed cutting of alfalfa, etc.
Reference: [1] Cowardin, L.M., Johnson, D.H., Shaffer, T.L., & Sparling, D.W., Applications of a Simulation Model to Decisions in Mallard Management, 1988, pp. 102. [2] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 96 -- 97.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Infiltration of Runoff
Brief Description: Measures of runoff infiltration include: modular paving, seepage beds, removing of downspouts, rock-lined channels, dutch drains, pressurized shafts, porous asphalt, grass swales, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 147. [2] Lager, J.A. & Smith, W.G., *Urban Stormwater Management and Technology: An Assessment*, 1984, pp. 130 -- 134.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Information for Soil Data Utilization
Brief Description: When utilizing soil data in land use planning, one must identify pertinent properties of each soil relating to potential agricultural use, wildlife-soil relationships, soil-water relationships, and soil properties influencing engineering uses.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., *Planning the Uses and Management of Land*, 1978, pp. 471 -- 472. [2] Haith, D.A. & Raymond, C.L., *Effectiveness of Soil and Water Conservation Practices for Pollution Control*, 1979, pp. 105 -- 106.
Key Words: Informed/Uninformed, Organized/Chaotic
Subject: Land Use Planning

Title: Information for Watershed Management
Brief Description: The types of information for watershed management include: information on land use -- water quality relationships, hydraulic data, soil survey data, topographic data, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 61 -- 62. [2] Toubier, J. & Westmacott, R., *Water Resources Protection Measures in Land Development -- A Handbook*, 1984, pp. 308 -- 310.
Key Words: Informed/Uninformed, Stable/Unstable
Subject: Water Resource Conservation

Title: Initiative
Brief Description: An initiative is a citizen proposed legislative measure that is put before the electorate for approval or rejection. It represents a way of obtaining direct voter opinion on a specific land-use issue. An initiative can be direct, indirect or advisory.
Reference: [1] Caves, R.W., *Land Use Planning*, 1992, pp. viii -- ix. [2] Berwagver, C., *Land Use Planning by Initiative*, 1987, pp. 43 -- 49. [3] Kotler, M., *Neighborhood Government*, 1977, pp. 241 -- 243.
Key Words: Active/Passive, Affiliative/Introverted
Subject: Public Participation

Title: Initiative Process
Brief Description: Ten steps are identified in an initiative process aimed at allowing citizens to vote directly on local land use issues, such as the rezoning of a tract of land or limiting the height of buildings in a certain area.
Reference: [1] Caves, R.W., Land Use Planning, 1992, pp. 16 -- 17. [2] Berwagner, C., Land Use Planning by Initiative, 1987, pp. 49 -- 54. [3] Kotler, M., Neighborhood Government, 1977, pp. 243 -- 246.
Key Words: Active/Passive, Affiliative/Introverted
Subject: Public Participation

Title: Innovative On-Site Sewage Disposal System
Brief Description: Innovative on-site sewage disposal systems include: the mound system, evapotranspiration bed, low pressure pipe system, filter system, cinder block system, aerobic system, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 177. [2] TJCOG, Summary of Alternative On-Site Wastewater Treatment and Disposal Methods, 1978.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Interim Regulations
Brief Description: Interim regulations, also called moratoriums, are used to temporarily slow or stop development in environmentally sensitive areas until a planning process has been completed and a scheme of permanent controls has been devised and implemented.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 169 -- 170. [2] Henning, D.H., Environmental Policy and Administration, 1984, pp. 263 -- 265.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Internalization
Brief Description: A charge is imposed on the negative effect or a subsidy on the beneficial effect which is emitted by an economic unit. It has the advantage of letting the economic units involved decide on the best adjustment to be made in the light of all costs and benefits.
Reference: [1] D.A.L.AULD, Economic Thinking and Pollution Problems, 1982, pp.16 -- 17. [2] Hines, L.G., Environmental Issues, 1983, pp. 192. [3] Roos, L.L.Jr. & Roos, N.R., Pollution, Regulation and Evaluation, 1981, pp. 174 -- 177.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Intervention Measures
Brief Description: Intervention measures are the actions necessary to complete an environmental management program, consisting of regulations, capital improvements, pricing mechanisms, taxation schemes, bonus/penalty provisions, education programs, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 165. [2] Magazine, A. H., *Environmental Management in Local Government*, 1977, pp. 152 -- 153.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Isard's Model
Brief Description: Isard's economic-ecologic model is an environmental assessment method, represented in activity analysis (mathematical programming) format with the rows denoting commodities and the columns describing activities.
Reference: [1] James, D.E., Jansen, H.M.A. & Opschoor, J.B., *Economic Approaches to Environmental Problems*, 1978, pp. 198 -- 203. [2] Isard, W., *On the Linkage of Socio-Economic and Ecological Systems*, 1968.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: "Know The Rocks"
Brief Description: The type of rock largely determines topography, hydrology, and soils. These, in turn, influence the nature and distribution of flora and fauna. Thus, to assess the environmental impacts of human actions, one must "know the rocks".
Reference: [1] Baldwin, J. H., *Environmental Planning and Management*, 1985, pp. 60. [2] Keyes, D.L., *Land Development and the Natural Environment: Estimating Impacts*, 1975, pp. 127.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Kuchler's System
Brief Description: The Kuchler system can be used to predict which wildlife species should be present in different regions. Since it is based on potential vegetation, the wildlife-species composition could change as a result of agricultural practices, logging, and development.
Reference: [1] Thomas, J.W., *Wildlife Habitats on Managed Forests of the Blue Mountains of Oregon and Washington*, 1979, pp. 46 -- 47. [2] Hair, J.D., *Ecological Perspectives on Wildlife Management*, 1977, pp. 149 -- 155.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Lake Construction
Brief Description: Lakes created or made habitable for specified fish species. This includes structures to create conservation pools or to increase water depth of existing lakes.
Reference: [1] US Dept of Agriculture, Wildlife and Fish Habitat Management in the Forest Service, 1983, pp. 127. [2] Burger, G.V., Practical Wildlife Management, 1990, pp. 229 -- 231. [3] Cadieux, C.L., Wildlife Management on Your Land, 1985, pp. 276.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Lakewood's Referral Process
Brief Description: The city of Lakewood in Denver area uses what is called a referral process, which produces a "procedural" environmental impact statement for many land use decisions on a development-by-development basis.
Reference: [1] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 50 -- 51. [2] Henning, D.H., Environmental Policy and Administration, 1984, pp. 279 -- 281.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Land Acquisition
Brief Description: Acquisition refers to any action, such as purchase, donation, and land exchanges, by which a state or local government obtains an interest in land, including full ownership or a lesser interest such as an easement or a leasehold.
Reference: [1] Field, R.M., State and Local Acquisition of Floodplains and Wetlands, 1981, pp. 3. [2] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 179 -- 182.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Land Administration
Brief Description: In Puerto Rico, the Land Administration, a public corporation created by the city's land banking program, is authorized to acquire land, by purchase, eminent domain, barter, etc. The land may be improved and then sold or leased for development.
Reference: [1] Strong, A.L., Land Banking, 1979, pp. 253 -- 256. [2] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 185 -- 189. [3] Seneker, C.J., Land Use Regulations for Urban Growth Control, 1984, pp. 159 -- 162.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Land Application of Effluent
Brief Description: An advanced treatment method, also called "living filter" method. Treatment of the waste water is provided by natural biological and chemical processes as it moves through the living filter provided by the soil, plants, microorganisms, and related ecosystems.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 634 -- 642. [2] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 182. [3] BNA, Water Pollution Control (Policy and Practice Section), 1979.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Land Application System Planning
Brief Description: The process of planning a land application system begins with the collection of basic data on the chemical and physical qualities of the waste water and sludge, followed by site selection/evaluation and efforts to obtain and maintain local support.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, pp. 661 -- 662. [2] Thomas, R.W., Land Disposal: An Overview of Treatment methods, 1983, pp. 476 -- 484.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Land Banking
Brief Description: Land banking is an important adjunct of the planning and land use control process. In its simplest form, the government purchases land for later use in accordance with a long-range master plan.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, pp. 39 -- 40. [2] Caves, R.W., Land Use Planning, 1992, pp. 33. [3] Strong, A.L., Land Banking, 1979, pp. 2.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Land Capability Evaluation
Brief Description: Land capability evaluation is to identify those land resources that, if developed, could result in the loss of valuable natural or man-made resources and environmental degradation.
Reference: [1] Gordon, S.I., Computer Models in Environmental Planning, 1985, pp. 116 -- 151. [2] Schneider, D.M., Computer-Assisted Land Resources Planning, 1979. [3] Valsin, R.D., Protection of Sensitive lands, 1976, pp. 73 -- 75.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Land Classification Criteria
Brief description: Land can be classified according to inherent characteristics of the land, land qualities, the responses of crops to management, current land use, potential land uses, recommended land uses, land use design, and decided land uses.
Reference: [1] Bailey,R.G., Integrated Approaches to Classify Land as Ecosystems, Forestry Land Evaluation, 1981, pp. 210 -- 215. [2] Vink,A.P.A., Landscape Ecology and Land Use, 1981, pp. 201 -- 206.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Land Classification Plan
Brief Description: A land classification plan is a definitive format for designating the desired pattern of activities or development types. Such a plan makes choices from among several suitable locations for a particular activity.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 138 -- 139. [2] Bailey,R.G., Integrated Approaches to Classify Land as Ecosystems, Forestry Land Evaluation, 1981, pp. 95 -- 109.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Land Consolidation
Brief description: Land consolidation, one form of land improvement, is carried out for making an area more suitable for the existing or new land uses. A land consolidation project may include roads improvement, water conditions improvement, trees planting, etc.
Reference: [1] Vink,A.P.A., Landscape Ecology and Land Use, 1981, pp. 195 -- 198. [2] Hudson,N., Soil Conservation, 1981, pp. 167 -- 169. [3] Eyre,S.R., Vegetation and Soils, 1978.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Land Improvement
Brief Description: Land improvement is a kind of land transformation aimed at an improvement of the land for a planned or existing land use and has effects of long duration. Land may be improved through proper land management and various soil improvement methods.
Reference: [1] Vink,A.P.A., Landscape Ecology and Land Use, 1981, pp. 188 -- 194. [2] Hayes,Jr.S.P., Evaluating Development Projects, 1979, pp. 250 -- 251. [3] Hudson,N., Soil Conservation, 1981.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Land Pollution Control Strategy
Brief Description: The strategies include regulation of the operation of refuse collection and disposal sites and facilities, certification of personnel to operate disposal facilities or sites, refuse dumping control, monitoring contaminant discharges at their source, etc..
Reference: [1] Haskell, E.H. & Price, V.S., State Environmental Management, 1983, pp. 14 -- 15. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 264 -- 270.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Land / Public Facilities Dedication
Brief Description: A technique employed by cities to control land use. In this system, developers are required to share this burden with the city by denoting land for various public purposes or by installing local public facilities.
Reference: [1] Caves, R.W., Land Use Planning, 1992, pp. 32 -- 33. [2] Peterson, G.E. & Yampolsky, H., Urban Development and the Protection of Metropolitan Farmland, 1985, pp. 217 -- 220.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Land Surface Models
Brief Description: Land surface models for pollutant analysis include: nonpoint source model, terrestrial ecosystem and hydrology model, agricultural runoff model, storm water management model, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 99 -- 102. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 135 -- 140.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Land Surface Sanitation
Brief Description: Keeping the land clean will have stormwater runoff contain less pollution. Its measures include street sweeping improvements and cleaning catch basins and storm sewers of accumulated debris.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 185 -- 186. [2] Paroni, J.L., Handbook of Water Quality Management Planning, 1977, pp. 194 -- 197.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Land Use Design
Brief Description: Approaches to land use design include: sieve analysis, threshold analysis, analysis of interconnecting decision areas (AIDA), potential surface analysis (PSA), Land use competition models (LCM), and planning balance sheet analysis (PBSA).
Reference: [1] Vink, A.P.A., Landscape Ecology and Land Use, 1981, pp. 229 -- 231. [2] Fabos, J.G. & Caswell, S.J., Composite Landscape Assessment, 1977, pp. 163 -- 165. [3] Mark, S.M., Land Use: Tough Choices in Today's World, 1977, pp. 434 -- 435.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Land Uses Allocation Criteria
Brief Description: Factors to be considered in the allocation of land uses in wildland settings include soil, vegetation, surface and ground water hydrology, active geomorphic processes, faunal habitats, climate, topographic characteristics, and natural attractiveness.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 450 -- 461. [2] Davidson, D.A., Soils and Land use Planning, 1980, pp. 140 -- 143.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Land Utilization Type
Brief Description: A land utilization type is a coherent complex of human activities and is characterized by social/institutional characteristics, infrastructural characteristics, nature/kind/quantity of products, basic investments, annual costs, labor intensity, etc.
Reference: [1] Vink, A.P.A., Landscape Ecology and Land Use, 1981, pp. 142 -- 146. [2] Fabos, J.G. & Caswell, S.J., Composite Landscape Assessment, 1977, pp. 290 - 291. [3] Hayes Jr., S.P., Evaluating Development Projects, 1979.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Landfill Site Selection
Brief Description: An ideal fill site should be excavated in dense (compact) clay soils and relatively high-level ground. In addition, the clay should not be interlayered with sand or gravel, should not be subject to cracking upon drying, and should be stable against landslides.
Reference: [1] Catanese, A. C. & Snyder, J. C., Urban Planning, 1988, pp. 295. [2] Herriman, R.C., Soil and Landscape Factors in Siting Sanitary Landfills, 1982, pp. 235 -- 244.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Landgard System
Brief Description: The Landgard system is the most advanced refuse pyrolysis process and can achieve volume reductions of 90% and is relatively pollution free.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 81 -- 82. [2] Stirrup, F.L., Public Cleansing: Refuse Disposal, 1975, pp. 82 -- 84. [3] William, S., Third Pollution: Problem of Solid Waste Disposal, 1975, pp. 149 -- 152.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: LANDSAT
Brief Description: LANDSAT is an important source of land use information that can be useful in evaluating nonpoint sources of pollution. LANDSAT data are available from the EROS Data Center in photographic formats and in the form of computer-compatible tapes.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 128 -- 129. [2] Keyes, D.L., Land Development and the Natural Environment: Estimating Impacts, 1975, pp. 197 -- 200.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Landscape Investigation Strategy
Brief Description: The approaches to landscape investigations include: the phytocentric approach (from the viewpoint of plant communities), the zoocentric approach (from the viewpoint of animal communities), and the anthropocentric approach (from the human viewpoint).
Reference: [1] Vink, A.P.A., Landscape Ecology and Land Use, 1981, pp. 77 -- 83. [2] Fabos, J.G. & Caswell, S.J., Composite Landscape Assessment, 1977, pp. 130 -- 132. [3] Eyre, S.R., vegetation and Soils, 1978, pp. 224 -- 225.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Landscape Survey
Brief Description: A landscape survey should make record of: existing trees and woodlands; soils more suited to forest than agriculture, exposed areas needing wind shelter; slopes, water courses, gathering grounds needing tree cover for protection; etc.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 149. [2] Vink, A.P.A., Landscape Ecology and Land Use, 1981, pp. 75 -- 92. [3] Fabos, J.G. & Caswell, S.J., Composite Landscape Assessment, 1977, pp. 125 -- 127.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Landslides Control
Brief Description: In controlling landslides, a detailed geotechnical investigation must be made prior to construction in suspected landslide-prone areas.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 61. [2] Bailey, R.G., Landslide Hazards Related to Landuse Planning, 1981, pp. 146 -- 148. [3] Valsin, R.D., Protection of Sensitive lands, 1976, pp. 176 -- 177.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Large Lot Residential Zoning
Brief Description: Large lot residential zoning can envision low density development, minimize adverse environmental impacts, provide adequately for sewage disposal, prevent overcrowding of the land, lessen congestion, and promote health.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 171 -- 172. [2] Hayes Jr., S.P., Evaluating Development Projects, 1979, pp. 157 -- 159.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Leachate Collection Systems
Brief Description: The leachate collection systems range from a simple trench or low dam across a natural drainageway where leachate is discharging, to elaborate tile fields laid in gravel between the sand cover of the liner and the base of the waste.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 782 -- 783. [2] Imhoff, K. & Fair, G.M., Sewage Treatment, 1980, pp. 188 -- 198. [3] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 296 -- 300.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Leachate Prevention Strategy
Brief Description: Fabric, paved, or clay liners can be installed under landfills to provide an impermeable barrier to leachates -- these liquids that emanate from the decomposing waste can contaminate local water supplies.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, pp. 781 -- 784 -- 785. [2] Weiss, S., Sanitary Landfill Technology, 1984, pp. 45 -- 50.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Leachate Treatment Systems
Brief Description: The systems include surface application of leachate by pumping and spraying on the soil for renovation by air, sunlight, and biological action; disposal of leachate in a subsurface seepage field; etc.
Reference: [1] Elliott, L.R. & Stevenson, F.J., *Soils for Management of Organic Wastes and Waste Waters*, 1977, pp. 530 -- 534. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., *Planning the Uses and Management of Land*, pp. 782 -- 783.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Leaf Sprays Anti-Transpiration
Brief Description: There are three ways in which leaf sprays can be used to reduce transpiration: reflecting materials, film-forming materials, materials increasing stomatal resistance.
Reference: [1] Mather, J.R., *Water Resources*, 1984, pp. 235. [2] Swenson, H.A. & Baldwin, H.L., *A Primer on Water Quality*, 1975, pp. 79 -- 80. [3] Toubier, J. & Westmacott, R., *Water Resources Protection Measures in Land Development - A Handbook*, 1984, pp. 326.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Legal Basis of Land Use Controls
Brief Description: The legal basis of land use controls include valid public objectives, reasonable methods, non-discrimination, discretionary power prevention, and absence of "taking (without just compensation)".
Reference: [1] Seneker, C.J., *Land Use Regulations for Urban Growth Control*, 1984, pp. 275 -- 280. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., *Planning the Uses and Management of Land*, 1978, pp. 958 -- 959. [3] Chapin, F., *Urban Land Use Planning*, 1975, pp. 25.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Leopold Matrix
Brief Description: An environmental impact analysis method. The matrix consists of a list of development actions ranged horizontally and a list of environmental components ranged vertically. Then, a comprehensive reference list of possible impacts is provided.
Reference: [1] Lovejoy, D., *Land Use and Landscape Planning*, 1979, pp. 60 -- 61. [2] Roberts, R.D., *Planning and Ecology*, 1984, pp. 83 -- 87. [3] Goodman, A.S., *Water Resources Planning*, 1984, pp. 476 -- 478.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Linear Programming
Brief Description: Linear programming is a management tool which has several valuable applications in improved solid waste management, for example, it can permit the design of an optimal collection network, locate the best disposal/reclamation sites, etc.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 222 -- 223. [2] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 169 -- 171.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Locational Planning
Brief Description: Location planning refers to specifying the type, location, and intensity of activity and development in sensitive areas and it takes two forms: prohibition approach and compartmentalization approach.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 136 -- 143. [2] Chapin, F., Urban Land Use Planning, 1975, pp. 125 -- 126.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Locational Principles
Brief Description: Locational principles to guide growth in order to lessen watershed pollution loads from new development include: limit growth within watersheds, encourage compact growth patterns, limit infrastructure investments within watersheds, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 123 -- 124. [2] Skidmore, O. & Merrill, Assessment and Recommendations for Community Water Resources Planning, 1980, pp. 239 -- 240.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Low-Flow Augmentation
Brief Description: Low-flow augmentation, the controlled release of impounded water to dilute the level of pollution in streams, thereby raising the quality of the water, is an innovative pollution abatement technique and its costs are wholly absorbed by the federal government.
Reference: [1] Hines, L.G., Environmental Issues, 1983, pp. 239 -- 240. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 230 -- 234.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Management Plan of Water Quality
Brief Description: It is composed of water quality analysis, wastewater source analysis, social/economic/land use analysis, planning criteria, political/administrative analysis, resource capacity analysis, alternatives analysis and water quality management strategy.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 175. [2] Gehm, H.W. & Bregman, J.I., Handbook of Water resources and Pollution Control, 1976, pp. 292 -- 299.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Management Reserve
Brief Description: In coping with the threat that the costs of an environmental program will be exceeded, one frequently used procedure is to multiply the estimated program costs by some "fudge factor" -- 105% or 110% -- so as to take into account anticipated problems.
Reference: [1] Brill, A.E., Techniques of EDP Project Management, 1984, pp. 214 -- 215. [2] Frame, J.D., Managing Projects in Organizations, 1988, pp. 179 -- 180. [3] Davies, C., Organization for Program Management, 1979, pp. 227 -- 229.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environment Management

Title: Management Strategy of Stormwater
Brief Description: Stormwater management methods include: storage of stormwater, increase infiltration, reduce velocity of overland/channel flow, filtration, frequent street cleaning, etc. These methods are effective in controlling pollutants carried by stormwater runoff.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 47 -- 50. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 276 -- 277.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Manipulation of Vegetation
Brief Description: Manipulation of vegetation is a tool commonly used to aid in maintaining wildlife species. Strategies include: removal of understory vegetation in the forest, small clearings within woodlands, thinning practices, rangeland improvements, etc.
Reference: [1] Billings, W.D., Plants and the Ecosystem, 1975. [2] Thomas, J.W., Wildlife Habitats on Managed Forests of the Blue Mountains of Oregon and Washington, 1979, pp. 185. [3] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 138 -- 139.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: McHarg Method
Brief Description: McHarg developed a matrix of proposed land use categories against the natural (physical) determinants and intercompatibility of other land uses and the most compatible land uses can be revealed with respect to both other land uses and the natural determinants.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 309. [2] Chapin, F.Jr., Urban Land use Planning, 2d. ed., 1975, pp. 223 -- 224.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: METLAND
Brief Description: Fabos developed a metropolitan Landscape Planning Model, named "METLAND", facilitating the assessment of special resources, hazards, development suitability, and ecological stability, and utilizing computerized procedures.
Reference: [1] Vink, A.P.A., Landscape Ecology and Land Use, 1981, pp. 234 -- 235. [2] Fabos, J.G., Greene, C.M., & Joyner, S.A., Metropolitan Landscape Planning Model, 1978. [3] Fabos, J.G. & Caswell, S.J., Composite Landscape Assessment, 1977, pp. 215 -- 216.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: Michigan Approach to Agricultural Zoning
Brief Description: This approach suggests the preparation of an agricultural plan to provide a factual base to support agricultural zoning.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 965 -- 966. [2] MFB, The Use of Zoning to Retain Essential Agricultural Lands, 1976.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Miscellaneous Controls
Brief Description: A zoning ordinance can be used as a rag-bag for all sorts of regulations which overload the land-use control system and can be better dealt with by local bylaws or tendency agreements and restrictive covenants.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 50 -- 51. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 194 -- 198.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Mulch Cover
Brief Description: During construction phases, mulches can be used to enhance vegetative growth by conserving soil moisture, moderating soil temperatures, reducing the soil erosion, improving soil properties, and improving stands and plant populations.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 494 -- 495. [2] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 154 - 155.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Multiobjective Decision Matrix
Brief Description: This matrix combines technical evaluations and objective weights using the techniques of additive weighing to obtain an overall environmental impact evaluation index for each development alternative.
Reference: [1] Goodman, A.S., Water Resources Planning, 1984, pp. 174 -- 175. [2] Canter, L., Environmental Impact Assessment, 1977, pp. 249 -- 250. [3] Warner, L. & Preston, E., A Review of Environmental Impact Assessment Methodologies, 1984, pp. 210 -- 212.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Municipal Wastewater Treatment Processes
Brief Description: Treatment processes in practice to remove potential pollutants from municipal wastewaters include: bar screens, comminutors, fine screens, flotation, coagulation, sand filtration, aerated lagoons, activated sludge, trickling filters, activated carbon, etc.
Reference: [1] Lamb, J.C., Water Quality and its Control, 1985, pp. 267 -- 268. [2] Culp, R.L., & Culp, G.L., Advanced Wastewater Treatment, 1971.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Natural Ecosystems Protection
Brief Description: This includes protecting sensitive and ecologically significant lands, avoiding human development on hazardous lands, releasing / treating residuals appropriately, and internalizing costs to give a competitive advantage to less polluting goods and services.
Reference: [1] Baldwin, J.H., Environmental Planning and Management, 1985, pp. 22 -- 23. [2] Williamson, R.M. & Currier, W.F., Applied Landscape Management in Plant Control, 1981, pp. 102 -- 130. [3] Blacksell, M., Landscape Protection and Development Control, 1979, pp. 26 -- 29.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Natural Resource Base
Brief Description: Information of the natural resource base include data on the climate, physiography, geology, soils, mineral resources, surface/ground water resources, water recharge/discharge areas (floodlands, woodlands, wetlands), fish/ wildlife habitat areas, etc..
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 468. [2] Dasmann,R., Environmental Conservation, 1976, pp. 39 -- 40.
Key Words: Informed/Uninformed, Numerous/Scarce
Subject: Natural Resource Conservation

Title: Natural Resource Inventory
Brief Description: Natural Resource Inventory includes soils, land forms, water system, floodplain, water system, underlying geology, and vegetation.
Reference: [1] Lemay, J. & Harrison, E., Environmental Landuse Problems, 1984, pp. 169 -- 170. [2] Dasmann,R., Environmental Conservation, 1976, pp. 45 -- 46. [3] Catanese, A. C. & Snyder, J. C., Urban Planning, 1988, pp. 302 -- 303.
Key Words: Informed/Uninformed, Numerous/Scarce
Subject: Natural Resource Conservation

Title: Nature Conservation Criteria
Brief Description: Criteria in evaluating sites for nature conservation are: extent, diversity, naturalness, rarity, fragility, representativeness, research and educational value, recorded history, series position, and potential value.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 72 -- 73. [2] Redding,M.J., Aesthetics in Environmental Planning, 1983, pp. 73 -- 75. [3] Blacksell,M., Landscape protection and Development Control, 1979, pp. 240.
Key Words: Beautiful/Ugly, Intellect/Non
Subject: Landscape Management

Title: NAWDEX System
Brief Description: A variety of specific services are available through the National Water Data Exchange (NAWDEX): the identification of water data sources, nationwide indexing of water data, and data search assistance.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 122 -- 126. [2] Hayes Jr.,S.P., Evaluating Development Projects, 1979, pp. 173 -- 175.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Neighborhood Standards
Brief Description: An attempt to escape from the over-simplified and too uniform controls of traditional zoning is the tendency to create use zones which are adapted to only one or two neighborhoods.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 48 -- 50. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 114 -- 115.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Noise Control Principles
Brief Description: The system principles for noise control include: proper siting of human settlements, publication of design criteria, use of economic incentives, adoption of trade-offs, establishment of sound insulation requirements, noise control of leisure activities, etc.
Reference: [1] Ryding, S.O., Environmental Management Handbook, 1992, pp. 335 -- 339. [2] Aylor, D.E., Noise Reduction by Vegetation and Ground, 1982, pp. 234 -- 236. [3] Goldman, M.I., Controlling Pollution, 1977, pp. 245 -- 249.
Key Words: Polluted/Unpolluted, Quiet/Loud
Subject: Noise Pollution Control

Title: Noise-Control Strategy
Brief Description: Approaches to noise control include: insulation of noise-generators, placement of quieter components of urban systems, reduction of noise transmission, insulation of potential noise-receiver, etc.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 293 -- 294. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 260 -- 263. [3] George, H.H., Planning for Environmental Quality, 1970, pp. 205 -- 207.
Key Words: Polluted/Unpolluted, Quiet/Loud
Subject: Noise Pollution Control

Title: Nonpoint Pollution Sources
Brief Description: Pollutants from nonpoint sources gain entry into the aquatic environment primarily through surface runoff and secondarily through precipitation and groundwater seepage.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 252 -- 254. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 833 -- 838.
Key Words: Organized/Chaotic, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Nonregulatory Means of Land Use Control
Brief Description: Control of the location of critical public services, tax incentives, direct or indirect aids or subsidies, partial acquisition of property rights through easements or purchase of development rights, acquisition of fee simple title to land.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, pp. 57 -- 58. [2] Bosselman, F.P. & Callies, D., The Quite Revolution in Land use Controls, 1982, pp. 402 -- 405.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: NY's UDC
Brief Description: New York's Urban Development Corporation (UDC) is authorized to run the city's land banking programs. Funds for land acquisition and for the construction of infrastructure comes from a state-interest-bearing loan.
Reference: [1] Strong, A.L., Land Banking, 1979, pp. 257 -- 258. [2] Flechner, H.L., Land Banking in the Control of Urban Development, 1984, pp. 222 -- 223. [3] Seneker, C.J., Land Use Regulations for Urban Growth Control, 1984, pp. 179 -- 182.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: On-Site Disposal of Refuse
Brief Description: On-site disposal is the disposal of certain types of refuse at the place of origin and can reduce the cost of refuse collection. Home incinerators and garbage grinders are the most widely used methods.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 272 -- 273. [2] Liptak, B.G., Municipal Waste Disposal, 1991, pp. 370 -- 375.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: On-Site Wastewater Disposal System
Brief Description: On-site wastewater disposal systems include: anaerobic septic tanks, soil absorption systems, aerobic systems, elevated sand mounds, sand filter trench, evapotranspiration bed, stabilization ponds, multi-family cluster systems, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 149. [2] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 177 -- 181. [3] Sambasiva, B., Water, Ecology, Pollution, and Management, 1991, pp. 181 -- 185.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Open Space Area Ratio
Brief Description: An innovative zoning device which expresses the amount of open space that must be provided on a lot as a percentage not of the lot but of the floor area of the proposed building.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 39 -- 40. [2] Bronestein, D.A., Land Use Regulation: Construction Permits, 1977, pp. 208 -- 210. [3] Kusler, J.A., Regulating Sensitive lands, 1980, pp. 143 -- 145.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Operation of Sewage Disposal System
Brief Description: Providing for proper sewage disposal system operation and maintenance includes: licensing of plumbers and sewage scavengers, requirements for documentation of septate disposal, and the provision of septate disposal sites.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 173. [2] NCDONRACD, Draft Water Quality Management Plan for On-Site Waste Disposal, 1979.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Organic Planning
Brief Description: Areawide land use plans should seek to adjust land use development to natural patterns in the landscape rather than seek the imposition of an artificial design for development upon the landscape.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 468 -- 469. [2] Keyes, D.L., Land Development and the Natural Environment: Estimating Impacts, 1975, pp. 116 -- 117.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Output-Oriented Approach
Brief Description: A popular economic theory of pollution abatement. The basic driving force behind pollution is a failure to internalize social costs and benefits: polluters make money out of the pollution-generating activities, and someone else absorbs the costs.
Reference: [1] Watt, K.E.F., Understanding the Environment, 1982, pp. 170 -- 171. [2] Roos, L.L.Jr. & Roos, N.R., Pollution, Regulation and Evaluation, 1981, pp. 154 -- 155.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Outright Purchase System
Brief Description: Outright purchase is the most satisfactory subdivision control strategy where the land is to be developed primarily for recreational use.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 69 -- 70. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 204 -- 205.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Overland Flow System
Brief Description: A basic land application of waste water method. Waste water is applied over the upper reaches of sloped terraces and allowed to flow across the vegetated surface to runoff collection ditches.
Reference: [1] Thomas, R.W., Land Disposal II: An Overview of Treatment Methods, 1983, pp. 454 -- 456. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 638 -- 641.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: PADC Method
Brief Description: This ecological assessment method is for use in situations where little is known of the ecological value of a site and its surroundings. It is composed of a Project Specification Report (PSR) and a Impact Matrix. The procedure consists 3 phases.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 68 -- 71, 77 -- 78. [2] Isard, W., On the Linkage of Socio-Economic and Ecological Systems, 1968, pp. 72 - - 75. [3] Dasman, R., Environmental Conservation, 1986, pp. 240 -- 242.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Pay to Pollute
Brief Description: Similar to effluent charges, pay-to-pollute approach is the establishment of property rights in pollution and is supposed to keep pollution within acceptable levels without distorting the market allocation of resources.
Reference: [1] Hines, L.G., Environmental Issues, 1983, pp. 246 - - 248. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 44. [3] Roos, L.L.Jr. & Roos, N.R., Pollution, Regulation and Evaluation, 1981, pp. 12.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Peak Runoff Reduction Strategy
Brief Description: Peak runoff due to storms can be reduced by utilizing grade stabilization, swales, diversion structures adjacent to steep slopes, vegetative/nonvegetative cover, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 48 -- 49. [2] Haith, D.A. & Raymond, C.L., Effectiveness of Soil and Water Conservation Practices for Pollution Control, 1979, pp. 115 -- 116.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Performance Standards
Brief Description: Performance standards have been developed to control the emissions of pollutants such as noise, vibration, smoke, dust, odor, toxic matter, fire hazards, humidity, heat/glare, and radiation hazards. It attempts to control land uses by specific standards.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 37. [2] Hagevik, G. & Mandelker, D.R., Air Quality Management and Land Use Planning, 1984, pp. 166 -- 176.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Performance Standards Zoning
Brief Description: Performance standards zoning can be applied to not only industrial but also residential and commercial uses. It requires extra enforcement personnel with high technical ability.
Reference: [1] Hagevik, G. & Mandelker, D.R., Air Quality Management and Land Use Planning, 1984, pp. 167 -- 190. [2] Keyes, D.L., Land Development and the Natural Environment: Estimating Impacts, 1975, pp. 168 -- 170.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: PERT/CPM
Brief Description: Program Evaluation and Review Technique (PERT) and Critical Path Method (CPM) is a public project management tool best suited to initial development of a pollution control plan and is accomplished through time-event network analysis.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 221 -- 222. [2] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 174 -- 176.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Peterken Method
Brief Description: Peterken has developed a technique for assessing the conservation value of woodland and grassland on the presence of indicator plant species. In this method, a flora/fauna index is utilized.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 77 -- 78. [2] Fabos, J.G. & Caswell, S.J., Composite Landscape Assessment, 1977, pp. 215 -- 216. [3] Canter, L., Environmental Impact Assessment, 1977, pp. 86 -- 88.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Physical Controls
Brief Description: There are 4 categories of physical controls of land use: specifying land use pattern, specifying site design in sensitive areas, specifying practices to be used in on-going land uses, and specifying off-site treatment practices.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 134 -- 136. [2] Davidson, D.A., Soils and Land use Planning, 1980, pp. 152 -- 154.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Planned Grazing Systems
Brief Description: A system in which two or more grazing units are alternately rested from grazing in a planned sequence to improve forage production and for watershed protection.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 154. [2] Kusler, J.A., Regulating Sensitive Lands, 1980, pp. 56 -- 64.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Planning Base of Solid Waste Management
Brief Description: The planning base for local solid waste management includes data about population, economics, land use, physical conditions, government structure, legal framework, public facilities, transportation, etc.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 200 -- 210. [2] PDER, Solid Waste Management, 1981, pp. 175 -- 180. [3] Stirrup, F.L., Public Cleansing: Refuse Disposal, 1975, pp. 181 -- 182.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Planning Horizons
Brief Description: The planning horizon is the furthest point in time considered in an economic study of a region's natural resources. Four time periods that must be considered are: the economic life, the physical life, the period of analysis, and the construction horizon.
Reference: [1] Viessman, W. Jr. & Welty, C., *Water Management*, 1985, pp. 117 -- 118. [2] James, L. D. & Lee, R. R., *Economics of Water Resources Planning*, 1981, pp. 148 -- 149. [3] Clark, J. W., *Water Supply and Pollution Control*, 3d ed., 1977, pp. 52 -- 53.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Pneumatic-Tube Collection System
Brief Description: The most advanced and efficient solid waste collection system commercially available. Trash is dumped into a chute and sucked through a vacuum-powered pipeline to a centralized incinerator. These systems are currently in use in many European countries.
Reference: [1] Baldwin, J. H., *Environmental Planning and Management*, 1985, pp. 204 -- 205. [2] Hines, L. G., *Environmental Issues*, 1973, pp. 297. [3] PDER, *Solid Waste Management*, 1981, pp. 154 -- 156.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Pollutant-By-Source Matrix
Brief Description: This matrix is useful as a checklist to identify important cause-effect linkages within a pollution problem.
Reference: [1] Burby, R. J., Kaiser, E. J., Miller, T. L., & Moreau, D. H., *Drinking Water Supplies*, 1983, pp. 90 -- 92. [2] Warner, L. & Preston, E., *A Review of Environmental Impact Assessment Methodologies*, 1984, pp. 260 -- 262.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Pollution Abatement Strategy
Brief Description: In principle, there are four possible methods of pollution abatement: prevention of pollution at receptor points; controls over the spatial distribution of polluting activities; technical abatement; and structural abatement.
Reference: [1] James, D. E., Jansen, H. M. A. & Opschoor, J. B., *Economic Approaches to Environmental Problems*, 1978, pp. 154 -- 162. [2] Ayres, R. U. & Gutmanis, I., *Population, Resources and the Environment*, 1982, pp. 123.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Pollution Compensation
Brief Description: The unit(s) that generate(s) the effect come(s) to agreement with the recipient(s) of the effect on the proper level of the effect with a payment from one to another. Where the effect is measurable and the number of units involved is small this solution is feasible.
Reference: [1] D.A.L.AULD, Economic Thinking and Pollution Problems, 1982, pp. 16 -- 17. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 41 -- 43. [3] Roos, L.L.Jr. & Roos, N.R., Pollution, Regulation and Evaluation, 1981, pp. 161 -- 164.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Pollution Control of Stormwater Runoff
Brief Description: Measures to reduce the amount of pollution in stormwater runoff include: removal of pollution on-site, control of street and parking surfaces, treatment, lawn care, highway de-icing and service stations.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 148. [2] Clark, J.W., Water Supply and Pollution Control, 3d ed., 1977, pp. 176 -- 178. [3] Athayde, D., Preventive Approaches to Stormwater Runoff, 1977, pp. 30.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Pollution Interrelationship
Brief Description: Various forms of pollution are highly interdependent. Any reduction in some form of waste discharge is normally accompanied by an increase in another kind -- incineration of municipal and industrial refuse, for example, can easily lead to air pollution.
Reference: [1] D.A.L.AULD, Economic Thinking and Pollution Problems, 1982, pp. 46 -- 47. [2] Roos, L.L.Jr. & Roos, N.R., Pollution, Regulation and Evaluation, 1981, pp. 143 - 144.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Pollution Rights System
Brief Description: Pollution rights system involves the sale of marketable permits for the rights to discharge specified amounts of effluent in a given location per unit time.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 132. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 86 -- 89. [3] Roos, L.L.Jr. & Roos, N.R., Pollution, Regulation and Evaluation, 1981, pp. 11.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Population Modelling
Brief Description: Population modelling looks at how populations change in size and allows the planner to make determinations about environmental variables that may affect the population. Examples include One Pop, Turkey, Fisher, Deer, Eagle, Fish, Crane, Kite, and Disease.
Reference: [1] Cowardin,L.M., Johnson,D.H., Shaffer,T.L., & Sparling,D.W., Applications of a Simulation Model to Decisions in Mallard Management, 1988, pp. 1 -- 26. [2] Anderson,S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 89 -- 96.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: PPB System
Brief Description: Planning-Programming-Budgeting (PPB) system is a public project management tool suited for rational decision-making in pollution control and environmental protection.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 221 -- 222. [2] Henning,D.H., Environmental Policy and Administration, 1984, pp. 204 -- 206. [3] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 184 -- 186.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Predator Control
Brief Description: Management approaches to predator control involve habitat alteration, population manipulation, and biological control (such as husbandry, cultural, noise devices). Physical methods include trapping, removal, and enclosure fences.
Reference: [1] Pearson,E.W., A Review of Predator Research, 1981, pp. 79 -- 86. [2] Anderson,S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 437 -- 442. [3] Barryman,J.H., The Principles of Predator Control, 1981.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Prerequisite for Effective Pollution Control
Brief Description: Effective measures for dealing with pollution problems can develop only under the consistent coordination among all jurisdictions involved and that has careful regard to the complex interrelationships between the various forms of pollution.
Reference: [1] D.A.L.AULD, Economic Thinking and Pollution Problems, 1972, pp. 47 -- 48. [2] Imhoff,K. & Fair,G.M., Sewage Treatment, 1980, pp. 138 -- 140. [3] Viessman, W.Jr. & Welty,C., Water Management, 1985, pp. 226 -- 328.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Pressure Distribution System
Brief Description: A new subsurface application of sewage effluent method, using small diameter pipe with few holes, allowing equal distribution of effluent over the entire seepage area during each application.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 686 -- 687. [2] Clark, J.W., Water Supply and Pollution Control, 3d. ed., 1977, pp. 154 -- 155.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Primary Environmental Corridors
Brief Description: Southern Wisconsin Regional Planning Commission emphasizes the preservation of primary environmental corridors, which are a composite of the best remaining individual elements of the natural resource base of the region, in essentially natural open uses.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 478 -- 482.
Key Words: Intellect/Non, Numerous/Scarce
Subject: Natural Resource Conservation

Title: Primary Sewage Treatment
Brief Description: In primary sewage treatment, separate physical operations can be identified: screening devices, comminutors, grit removal, flowequalization, mixing, flocculation, sedimentation, flotation, and filtration.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 177. [2] Hines, L. G., Environmental Issues, 1983, pp. 230 -- 231. [3] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 520 -- 524.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Prime Land Definition Criteria
Brief Description: The definition criteria of prime land include soil properties (12), geographic-cultural properties (4), economic factors (2), environmental factors (5), and productivity index (2).
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 296 -- 299. [2] Peterson, G.E. & Yampolsky, H., Urban Development and the Protection of Metropolitan Farmland, 1985, pp. 2 -- 5.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Priority Treatment for High-Occupancy Vehicles
Brief Description: Encouraging the use of high-occupancy vehicles (buses, carpools, vanpools, etc) helps reduce air pollution. Priority treatment for these vehicles consists of allocating roadway facilities preferentially, providing a speed advantage, signal preemption, etc.
Reference: [1] Horowitz, J.L., Air Quality Analysis for Urban Transportation Planning, 1982, pp. 220 -- 280. [2] Hagevik, G., The Relationship of Land Use and Transportation Planning to Air Quality Management, 1982, pp. 240 -- 243.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Prohibitive Pollutant Sources
Brief Description: Pollutant source activities that should be prohibited in sensitive areas include: all industrial uses, employment centers, hospitals, commercial centers, heavily travelled highways, intensive animal care facilities, and high density housing.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 137 -- 138. [2] Ayres, R.U. & Gutmanis, I., Population, Resources and the Environment, 1982, pp. 23 -- 24.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Protection Agreement
Brief Description: The local governments get landowners to sign watershed protection agreements which commit them to control nonpoint pollution coming off their land as a condition for receiving a permit for development on their property.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 173. [2] Miller, T.L. & Raymond, J.B., Protecting Drinking Water Supplies Through Watershed Management, 1981, pp. 119 - 120.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Public Expenditure for Pollution Control
Brief Description: Public expenditures for pollution control are associated with: enforcement of control activities, reduction of emissions, monitoring of pollution concentrations, development on new techniques, and research on pollution effects.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 135 -- 141. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 186 -- 188.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Public Participation / Education Techniques
Brief Description: Public participation/education techniques include: public hearing, public meeting, site visit, citizen advisory body, citizen task force, role playing, workshops, delphi exercises, public interest center, slides/film presentation, formal attitude survey, etc.
Reference: [1] Goodman, A.S., Water Resources Planning, 1984, pp. 188 -- 194. [2] CF, Toward Clean water: A Guide to Citizen Action, 1976. [3] Kotler, M., Neighborhood Government, 1977, pp. 211 -- 214.
Key Words: Active/Passive, Affiliative/Introverted
Subject: Public Participation

Title: Pyrolysis
Brief Description: An innovative incineration system to overcome air pollution problem. Destructive distillation of wastes by heating under anaerobic conditions. The resulting mixture of residue can be recovered and sold to offset high capital investment and operating costs.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 206 -- 207. [2] Jackson, F.R., Recycling and Reclaiming of Municipal Solid Wastes, 1975, pp. 147 -- 150. [3] PDER, Solid Waste Management, 1981, pp. 190 -- 191.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Rapid Infiltration-Percolation
Brief Description: A basic land application of waste water method. Waste water is applied to highly permeable soils in basins by flooding or sprinkling. The basins may or may not be vegetated. This method requires the least amount of land area to treat a given volume of waste water.
Reference: [1] Thomas, R.W., Land Disposal: An Overview of Treatment Methods, 1983, pp. 485 -- 487. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 641 -- 642.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Raw Drinking Water Protection Strategy
Brief Description: Local government measures used to protect raw drinking water quality include: septic tank permits, forest management program, zoning/subdivision regulations, on-site stormwater management regulations, land acquisition, development rights acquisition, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 50 -- 52. [2] Skidmore, O. & Merrill, Assessment and Recommendations for Community Water Resources Planning, 1980, pp. 39 -- 42.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Recycling
Brief Description: An innovative solid waste management system. Recycling of useful materials, such as paper, glass, aluminum, and rubber, can provide a number of benefits to a community, such as reducing the demand for raw materials and the volume of solid wastes.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 206 -- 207. [2] Hines, L.G., Environmental Issues, 1983, pp. 301 -- 302. [3] Jackson, F.R., Recycling and Reclaiming of Municipal Solid Wastes, 1975, pp. 2 -- 10.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Recycling Promotion Strategy
Brief Description: One way government can promote recycling is to emphasize purchase of recycled products because this can bolster the market considerably by stabilizing and increasing the demand.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 215 -- 216. [2] Henstock, M.E., Recycling and Disposal of Solid Waste, 1975, pp. 199 - 211. [3] Melosi, M.V., Garbage in the Cities: Refuse, Reform, and the Environment, 1982, pp. 251 -- 256.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Reduced Tillage Farming
Brief Description: A soil conservation tool. Planting without removing the existing plant cover (including previous crop residuals) can reduce soil erosion by 95%. This is also a good management practice for controlling nonpoint pollution from rural land uses.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 176 -- 177. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 864.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Reduction of Negative Traffic Effect
Brief Description: Strategies aiming at restricting the effects of traffic on urban environment include: constructing ring roads, increasing the use of public transportation, using financial means of control, etc.
Reference: [1] Ryding, S.O., Environmental Management Handbook, 1992, pp. 399 -- 401. [2] Hagevik, G., The Relationship of Land Use and Transportation Planning to Air Quality Management, 1982, pp. 240 -- 243.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Referendum Process
Brief Description: Seven steps are identified in a referendum process aimed at allowing citizens to vote directly on local land use issues, such as adopting or rejecting a general plan, a growth management plan.
Reference: [1] Caves, R.W., Land Use Planning, 1992, pp. 17 -- 18. [2] Tymkovich, T.M., Referendum and Rezoning, 1982, pp. 45 -- 64. [3] CF, Toward Clean water: A Guide to Citizen Action, 1976, pp. 36 -- 39.
Key Words: Active/Passive, Affiliative/Introverted
Subject: Public Participation

Title: Refuse-Driven Fuel (RDF) System
Brief Description: A proven technology for energy recovery in solid waste disposal, which converts trash into a fuel that can be burned in waterwall incinerators or industrial and utility boilers. The incoming solid waste is shredded and noncombustible materials removed by physical manipulation.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 209 -- 210. [2] Jackson, F.R., Energy from Solid Waste, 1979, pp. 86 -- 89. [3] PDER, Solid Waste Management, 1981, pp. 139 -- 142.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Refuse Shredding
Brief Description: Refuse shredding is an innovative solid waste management method through which greater in-place refuse densities can be achieved. In this process, the refuse is compacted into uniform layers at the landfill. Recycling opportunities exist.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 71 -- 74. [2] Frey, D.N., Policies for Solid Waste Management, 1980, pp. 99 -- 101. [3] Noble, G., Sanitary Landfill Design Handbook, 1976, pp. 162 -- 169.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Regional Solid-Waste District
Brief Description: The solution to the scale inadequacies of the small locality is the formation of a regional solid-waste district that consolidates the refuse of a number of adjacent communities in order to take advantage of larger processing equipment.
Reference: [1] Hines, L.G., Environmental Issues, 1983, pp. 296 -- 297. [2] Noble, G., Sanitary Landfill Design Handbook, 1976, pp. 142 -- 144. [3] PDER, Solid Waste Management, 1981, pp. 195 -- 197.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Regulation Strategy of Septic Tanks
Brief Description: Septic tank system regulations should specify soil boring and percolation tests (conducted by a certified soil tester), construction, location, and size requirements for septic tanks and soil absorption systems.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 960 -- 961. [2] NCDONRACD, Draft Water Quality Management Plan for On-Site Waste Disposal, 1979, pp. 254 -- 257.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Regulatory Means of Land Use Control
Brief Description: They include zoning, subdivision controls, fire/housing/building/sanitation codes and official street mapping.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 57. [2] Delafons, J., Land-Use Controls in the United States, 1982, pp. 37 -- 39. [3] Erwin, D.E., Land Use Control, 1977, pp. 5 -- 46.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Remedy Externality
Brief Description: Care must always be exercised to take into account any additional costs or benefits associated with any remedy in pollution control processes. Governmental regulations are not costless.
Reference: [1] D.A.L.AULD, Economic Thinking and Pollution Problems, 1982, pp. 17. [2] Watt, K. E. F., Understanding the Environment, 1982, pp. 170 -- 171. [3] Magazine, A.H., Environmental Management in Local Government, 1977, pp. 74 -- 75.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Reservation Zone
Brief Description: Reservation zone should be the areas least suitable for development and that have intrinsic natural value -- aquifer recharge areas, floodplain, steep slopes, etc..
Reference: [1] Lemay, J. & Harrison, E., Environmental Landuse Problems, 1984, pp. 172 -- 173. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 194 -- 197.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Residential Water Conservation
Brief Description: Methods used to encourage residential water conservation include: water-saving devices (such as hot water pipe insulation, drip irrigation systems), changes in water use patterns (such as wastewater recycling), and changes in water rate structures.
Reference: [1] Viessman,W.Jr. & Welty,C., Water Management, 1985, pp. 234 -- 237. [2] Miline,M., Residential Water Conservation, 1976, pp. 27 -- 156. [3] Miline,M., Residential Water Reuse, 1979, pp. 53 -- 89.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Resource Matrix
Brief Description: As a planning tool, a resource matrix has the function of linking human and material resources to the tasks of an environmental program so as to determine how resources should be allocated.
Reference: [1] Brill,A.E., Techniques of EDP Project Management, 1984, pp. 194 -- 195. [2] Frame,J.D., Managing Projects in Organizations, 1988, pp. 184 -- 185. [3] Davies,C., Organization for Program Management, 1979, pp. 203 -- 204.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Resource Recovery Strategy
Brief Description: Methods of resource recovery include recycling, reuse, conservation of material resources and solid wastes.
Reference: [1] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 46 -- 47. [2] Jackson,F.R., Recycling and Reclaiming of Municipal Solid Wastes, 1975, pp. 17 -- 19. [3] PDER, Solid Waste Management, 1981, pp. 9 -- 10.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Resource Recovery Support
Brief Description: Local governments can assist in overcoming the high capital costs of resource recovery facilities by offering loan guarantees, tax exemptions for municipal industrial development, pollution bonds, or outright construction grants.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 211 -- 212. [2] Jackson,F.R., Recycling and Reclaiming of Municipal Solid Wastes, 1975, pp. 27 -- 32. [2] Jackson,F.R., Energy from Solid Waste, 1979, pp. 22 -- 23.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Resource Recovery System
Brief Description: A principle approach to recycling programs. Municipal wastes are collected and transported to a waste processing facility where ferrous metals and other materials can be recovered from the waste before or after incineration.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 208 -- 209, 213. [2] Jackson, F.R., Recycling and Reclaiming of Municipal Solid Wastes, 1975, pp. 59 -- 61.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Restoration of Landfill Sites
Brief Description: Former sanitary landfill sites can be used as parking lots, light traffic roadways, public parks, golf courses, shooting preserves, arboretums, playgrounds, athletic fields, recreation areas, farming, forestry, range land, etc.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 773 -- 774. [2] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 53.
Key Words: Stable/Unstable, Wet/Dry
Subject: Land Resource Conservation

Title: Rudimentary Principles
Brief Description: The rudimentary principles of managing an environmental program are: be conscious of what you are doing, invest heavily in the front-end spadework; anticipate the unanticipated problems; go beneath surface illusions; and be as flexible as possible.
Reference: [1] Brill, A.E., Techniques of EDP Project Management, 1984, pp. 175 -- 177. [2] Frame, J.D., Managing in Organizations, 1988, pp. 222 -- 229. [3] Organization for Program Management, 1979, pp. 287 -- 290.
Projects: Davies, C., pp. 287 --
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Runoff Control Strategy
Brief Description: Control methods for reducing runoff and erosion include such standard practices as terraces, diversions, and mulch cover.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 495. [3] Athayde, D., Preventive Approaches to Stormwater Runoff, 1977, pp. 61 -- 69.
Key Words: Sable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Rural Land Pollution Control
Brief Description: Best management practices for controlling nonpoint pollution from rural land uses include: access road, chiseling/subsoiling, deferred grazing, spring development, grassed waterway, crop residue use, field windbreak, grade stabilization structure, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 151 -- 161. [2] Haith, D.A. & Raymond, C.L., *Effectiveness of Soil and Water Conservation Practices for Pollution Control*, 1979, pp. 155 -- 163.
Key Words: Sable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Sanitary Landfill
Brief Description: The most technically simple and inexpensive disposal alternative to open dumping (\$2 to \$4 per ton, excluding land costs). It should be situated in a well-drained site away from major bodies of surface water or groundwater.
Reference: [1] Baldwin, J. H., *Environmental Planning and Management*, 1985, pp. 204 -- 205. [2] Hines, L.G., *Environmental Issues*, 1973, pp. 293 -- 294. [3] Rimberg, D., *Municipal Solid Waste Management*, 1975, pp. 49 -- 57.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Sanitary Regulations
Brief Description: Sanitary regulations are administered by zoning administrators. Two permits are required: a state septic tank permit and a local sanitary permit which is issued only after a determination that soils are adequate for on-site waste disposal.
Reference: [1] Clark, J.W., *Water Supply and Pollution Control*, 3d. ed., 1977, pp. 16 -- 19. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., *Planning the Uses and Management of Land*, 1978, pp. 962.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Scottsdale Collection Trunk
Brief Description: An innovative solid waste disposal method, which is saving Scottsdale, Arizona, more than \$350,000 annually, is the use of a collection truck with a long mechanical arm that picks up 80-gallon hard plastic containers placed on curbside.
Reference: [1] Baldwin, J. H., *Environmental Planning and Management*, 1985, pp. 203 -- 204. [2] Frey, D.N., *Policies for Solid Waste Management*, 1980, pp. 165 -- 167. [3] PDER, *Solid Waste Management*, 1981, pp. 239 -- 242.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Secondary Sewage Treatment
Brief Description: Secondary (biological) treatment processes of wastewater include: trickling filters, activated sludge, biological disc process, stabilization ponds, and complete-mixing aerated lagoons.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 177. [2] Hines, L.G., Environmental Issues, 1973, pp. 231 -- 233. [3] Meyerowitz, S., Water: The Pollution and Purification, 3rd ed, 1992, pp. 86 -- 102.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Sensitive Area for Water Protection
Brief Description: Environmentally sensitive areas for urban water supply protection purposes include: impoundments/shorelands, feeder stream corridors, steep/erodible areas, impervious soils, wetlands, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 139 -- 140. [2] Maddaus, W.O., Water Conservation, 1987, pp. 39 -- 42.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Sensitive Ecological Environments
Brief Description: Sensitive ecological environments include primary dunes, wetlands, floodplain, steep slopes, watersheds, shoreland districts, stream corridor districts, etc..
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 60. [2] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 174. [3] Dasmann, R., Environmental Conservation, 1976, pp. 223.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Conservation

Title: Septic Tank Drainfields Placement
Brief Description: They should be constructed with slopes of less than 3 % to promote a slow, gradual flow of effluent with sufficient time for proper degradation of the wastes, while slopes of greater than 8% may result in surface seepage near the lower end of the drainfield.
Reference: [1] Baldwin, J.H., Environmental Planning and Management, 1985, pp. 61 -- 62. [2] Houck, D.C., Contaminant Removal from Public Water Systems, 1985, pp. 373 -- 390. [3] Mancy, K.H., Instrumental Analysis for water Pollution Control, 1985, pp. 45.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Septic Tank Regulation
Brief Description: Local sanitary regulations should be designed to prohibit the installation of septic tank sewage disposal systems on soils having high water tables, low permeability, or excessively high permeability, and on excessively steep slopes.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 482 -- 483. [2] Paroni, J.L., Handbook of Water Quality Management Planning, 1977, pp. 128 -- 124.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Septic Tanks
Brief Description: As a safe and efficient means of sewage treatment, septic tanks are large steel or concrete containers that hold sewage under anaerobic conditions for at least 24 hours and then pass the liquid into a porous drainage or leach field.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 180 -- 182. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 665 -- 668.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Sewage Collection Improvement
Brief Description: Approaches to increase the efficiency of sewage collection include: extending sewerage facilities, centralizing waste water operations, separating storm runoff and sanitary sewers, etc.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 252 -- 253. [2] Babbitt, H.C. & Bauman, C.H., Sewerage and Sewage Treatment, 1978, pp. 43 -- 56.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Sewage Disposal Improvement
Brief Description: Approaches to minimize the effect of sewage disposal include: diversion to assigned waste channels, streamflow augmentation, temporary waste withholding, effluent dispersal by pipeline, soil purification utilization, increased sewage treatment, etc.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1974, pp. 253 -- 254. [2] Babbitt, H.C. & Bauman, C.H., Sewerage and Sewage Treatment, 1978, pp. 70 -- 85.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Sewer Moratoriums
Brief Description: Sewer moratoriums can be instituted to ensure the adequacy of public services and alleviate possible environmental damages resulting from the operation of septic tanks.
Reference: [1] Caves, R.W., Land Use Planning, 1992, pp. 32 -- 33. [2] Paroni, J.L., Handbook of Water Quality Management Planning, 1977, pp. 128 -- 134. [3] Mancy, K.H., Instrumental Analysis for Water Pollution Control, 1985, pp. 45.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Sewer Trunk Lines in Floodplain
Brief Description: Owing to their gradual, continuous gradients, floodplains present attractive sites for sewer trunk lines. But construction and maintenance of sewer lines may irreversibly impact the forest, soil, and drainage of the floodplain.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 51. [2] Platt, R.H., McMuller, M.G., Paton, R., Patton, A., & Grahek, M., Intergovernmental Management of Floodplains, 1985, pp. 156 -- 158.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Shallow-Trench System
Brief Description: An innovative subsurface application of sewage effluent method. It is ideal in permeable soils with deep ground water and bedrock.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 687 -- 688. [2] Thomas, R.W., Land Disposal: An Overview of Treatment Methods, 1983, pp. 485 -- 487.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Shoreland Regulation
Brief Description: Shoreland regulations should stipulate a shoreland zone covering all land owned by the water purveyor and limit tree cutting and shrubbery clearing, earth movement, construction, recreation, operation of vehicles and waste material handling.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 178. [2] Lesniak, J., Land Use Controls for Optimum Development, 1977, pp. 22 -- 34.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Site Analysis for Solid Waste Disposal
Brief Description: Locational analysis of solid waste reduction and disposal sites should consider topographic features, general soils, ground water, oil/gas/coal resources, clay/shale/rock deposits, timber, and climatology.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 207. [2] Loughry, F.G., The Soil Factor in Sanitary Landfill, 1977, pp. 210 -- 213. [3] Stirrup, F.L., Public Cleansing: Refuse Disposal, 1975, pp. 139 -- 140.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Site Design Principles
Brief Description: Site design principles to maximize infiltration of stormwater on-site are: avoid development on steep slopes, limit tree-clearing, minimize the percentage of impervious land cover, maximize the percentage of natural drainage, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 124 -- 125. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 257 -- 258.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Site Evaluation of Refuse Disposal
Brief Description: The chief considerations in evaluation of sites selected for refuse disposal are: proper drainage, shallow aquifers, earth materials, local water table, groundwater movement, etc.
Reference: [1] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 280 -- 282. [2] William, S., Third Pollution: Problem of Solid Waste Disposal, 1975, pp. 161 -- 162.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Site Level Measures
Brief Description: Site level measures are intended to reduce the impact of new development on hydrographic processes by reducing the level of pollutant generated, including control of erosion, control of hydrologic modification, and control of the operation of sewage disposal.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 144 -- 145. [2] Skidmore, O. & Merrill, Assessment and Recommendations for Community Water Resources Planning, 1980, pp. 192 -- 195.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: Sky Exposure Plane
Brief Description: A new zoning device which relates permissible height to a setback at the upper stories.
Reference: [1] Delafons, J., Land-Use Controls in the United States, 1982, pp. 39 -- 40. [2] Bronestein, D.A., Land Use Regulation: Construction Permits, 1977, pp. 210--211. [3] Kusler, J.A., Regulating Sensitive Lands, 1980, pp. 145 -- 147.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Slow Rate Irrigation
Brief Description: A basic land application of waste water method. Distribution of waste water is by fixed or moving sprinkler systems or by surface application. Slow-rate systems are suitable for both cropland and forestland.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 638. [2] Thomas, R.W., Land Disposal: An Overview of Treatment Methods, 1983, pp. 485 -- 487.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Sludge System
Brief Description: A basic secondary waste water treatment process. Here, air and sludge heavily laden with microorganisms are brought into close contact with the waste water in an aeration tank for several hours.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 634. [2] Imhoff, K. & Fair, G.M., Sewage Treatment, 1980, pp. 236 -- 238. [3] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 186 -- 190.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Sludge Treatment and Disposal
Brief Description: Treating and disposing sludge is composed of thickening (by gravity settling), stabilizing, conditioning, dewatering (by flotation, filtration), drying (by heating), composting, and thermal reduction (by incineration, pyrolysis).
Reference: [1] Lamb, J.C., Water Quality and its Control, 1985, pp. 288 -- 290. [2] U.S. EPA, Process Design Manual for Sludge Treatment and Disposal, 1984, pp. 241 -- 245. [3] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 543 -- 546.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Social Impact Assessment
Brief Description: Methods of social impact assessment available to environmental planners include: institutional analysis, policy profiling, value mapping, social profiling, content analysis, human cost accounting, ethnographic field analysis, etc.
Reference: [1] Goodman,A.S., Water Resources Planning, 1984, pp. 490 -- 503. [2] Fitzsimmons,S.J., Social Assessment Manual, 1977. [3] Dasmann,R., Environmental Conservation, 1976, pp. 223.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Soil Bearing Capacity by Groundwater
Brief Description: The urbanized area of Houston, Texas, has subsidized as a result of groundwater pumping for municipal water supplies, because groundwater is one of the weight-supporting components of soil, and its reduction can result in a volumetric decrease of soil.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 71 -- 72. [2] Lesniak, J., Land Use Controls for Optimum Development, 1977, pp. 123 -- 125. [3] Davidson,D.A., Soils and Land Use Planning, 1980, pp. 174 -- 175.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Soil Conservation Dilemma
Brief Description: Soil Conservation may have long-term benefits in that it helps to ensure that the productivity of the land is maintained. But from the point of view of the individual farmer there is much less apparent benefit in adopting better practices.
Reference: [1] Mather, A. S., Land Use, 1986, pp. 200. [2] Brown,W.M., Hines,W.G., Ricket,D.A., & Beach,G.L., A Synoptic Approach for Analyzing Erosion as a Guide to Land-Use Planning, 1979, pp. 249 -- 250.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Soil Conservation Practice Selection
Brief Description: The best alternatives of soil conservation practice depend on such factors as land use, soil type characteristics, slope length and steepness, landscape information, land ownership and leasing arrangement, and land user's abilities.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 150 -- 151. [2] Leonard,P., Management Agreements: A Tool for Conservation, 1983, pp. 368 -- 370.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Soil Consideration in Landfill
Brief Description: For small- and medium-sized landfills dependent on in-situ assimilation of the waste, soil is the major factor in prevention of hazards and nuisances. Choice of a landfill site with soil that can accomplish the key functions is a prime consideration.
Reference: [1] Noble, G., Sanitary Landfill Design Handbook, 1976, pp. 131 -- 134. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 772 -- 774.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Soil Consideration in Land Use
Brief Description: The influence of soil on land use is related to particle composition and water content. Poorly drained, fine-grained soil poses the greatest limitation to most land uses, while coarse-grained soils are most attractive to residential and transportation uses.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 70. [2] Davidson, D.A., Soils and Land Use Planning, 1980, pp. 251 -- 252. [3] Storie, R.E., Handbook of Soil Evaluation, 1984.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Soil Consideration for Septic Tanks
Brief Description: Since soils with high water contents have low water-transmitting capacity, waste water does not readily pass from the septic tank drain field into the soil. The soil drainage capacity can easily be exceeded, producing surface seepage of unsanitary water.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 70. [2] U.S. EPA, Process Design Manual for Sludge Treatment and Disposal, 1984, pp. 214 -- 215. [3] Imhoff, K. & Fair, G.M., Sewage Treatment, 1980, pp. 247 -- 258.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Soil Data Interpretations
Brief Description: Soil data interpretations should include suitability ratings for potential land uses, for septic tank disposal field, for use as a source material for road base, for flooding potential, and for wildlife habitat and habitat improvement.
Reference: [1] Davidson, D.A., Soils and Land Use Planning, 1980, pp. 141 -- 145. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 471 -- 473.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Soil Erodibility
Brief Description: The susceptibility of soil to erosion, termed erodibility, is controlled by vegetation, particle size, and cohesiveness as well as by slope geometry and the intensity and frequency of rainfall or wind.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 90 -- 91, 95. [2] Brown, W.M., Hines, W.G., Rickett, D.A., & Beach, G.L., A Synoptic Approach for Analyzing Erosion as a Guide to Land-Use Planning, 1979, pp. 249 -- 250.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Soil Erosion Control
Brief Description: Soil erosion can be controlled in a number of ways, including stream bank protection, reduced tillage farming, contour and strip cropping, crop rotation and cover crops, windbreaks, terracing, and land classification.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 176 -- 177. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 98 -- 99.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Soil Information Sources
Brief Description: Three major publications are National Soils Handbook, Soil Survey Manual, and Soil Taxonomy. Another information source is soil maps and soil survey reports. A final source of soil information is the Agricultural Experiment Station in State Universities.
Reference: [1] Peterson, G.E. & Yampolsky, H., Urban Development and the Protection of Metropolitan Farmland, 1985, pp. 27 - 29. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 232 -- 233.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Soil Survey Investigation Reports
Brief Description: The most common source of published soil data is the US Department of Agriculture series Soil Survey Investigation Reports. To date, 30 reports have been published.
Reference: [1] Haith, D.A. & Raymond, C.L., Effectiveness of Soil and Water Conservation Practices for Pollution Control, 1979, pp. 15 -- 16. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 86.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Solid Waste Disposal Charges
Brief Description: They are paid by consumers to cover the waste management costs for products, based on product weight or volume. The intent is to provide a financial incentive for manufacturers and consumers to avoid excess packaging and to use recycled materials.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 214 -- 215. [2] Frey, D.N., Policies for Solid Waste Management, 1980, pp. 116 -- 117. [3] PDER, Solid Waste Management, 1981, pp. 134 -- 135.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Solid Waste Disposal Facility Selection
Brief Description: The selection criteria of solid waste disposal facility are based on the nature of impacts to surface water and groundwater, air quality, and public safety and the use of a cover material. Facilities that allow open burning are unacceptable.
Reference: [1] Lesniak, J., Land Use Controls for Optimum Development, 1977, pp. 123 -- 125. [2] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 203 -- 204.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Solid Waste Management
Brief Description: Solid waste management includes choosing the optimal time and place to release solid waste and treating them through various combinations of collection, concentration, containment, detoxification, recycling, and isolation from human and ecological systems.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 22 -- 23. [2] Frey, D.N., Policies for Solid Waste Management, 1980, pp. 11 -- 17. [3] PDER, Solid Waste Management, 1981, pp. 10 -- 13.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Sorensen Method
Brief Description: Sorensen developed an environmental impact analysis method based on a combination of matrices and networks. This method can be applied to various land use options, such as residential development or crop farms.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 64. [2] Roberts, R.D., Planning and Ecology, 1984, pp. 87 -- 89. [3] Goodman, A.S., Water Resources Planning, 1984, pp. 478.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Source Separation System
Brief Description: A principle approach to recycling programs. Recyclable waste materials are separated and either collected by a private or public collection service or taken to a neighborhood recycling center by individual businesses or homeowners.
Reference: [1] Jackson, F.R., *Recycling and Reclaiming of Municipal Solid Wastes*, 1975, pp. 263 -- 268. [2] Baldwin, J. H., *Environmental Planning and Management*, 1985, pp. 208, 212 -- 213.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Spacing Controls over Filling Stations
Brief Description: As an air pollution control strategy, zoning regulations should prohibit filling stations from locating within a certain distance of places of public assembly, such as churches, and residences / apartment houses.
Reference: [1] Hagevik, G., Mandelker, D.R., & Brail, R.K., *Air Quality Management and Land Use Planning*, 1974, pp. 12. [2] Hagevik, G., *Decision Making in Air Pollution Control*, 1980, pp. 134 -- 136. [3] Tebbens, B.D., *Air Pollution Control*, 1978, pp. 113 -- 115.
Key Words: Fragrant/Rancid, Polluted/Unpolluted
Subject: Air Pollution Control

Title: Special Use Zone
Brief Description: This land use control device, also called combination zone, provides a separate use zone for one particular use or small group of closely related uses. The purpose is to allow certain types of use in some areas of the same general use zone.
Reference: [1] Delafons, J., *Land-Use Controls in the United States*, 1982, pp. 44 -- 45. [2] Davidson, D.A., *Soils and Land Use Planning*, 1980, pp. 174 -- 179. [3] Kusler, J.A., *Regulating Sensitive Lands*, 1980, pp. 184 -- 185.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Spring Development
Brief Description: An erosion control technique. Improving springs and seeps by excavating, clearing, capping, or providing collection and storage facilities.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., *Drinking Water Supplies*, 1983, pp. 154. [2] Kusler, J.A., *Regulating Sensitive Lands*, 1980, pp. 77 -- 78.
Key Words: Good/Bad, Stable/Unstable
Subject: Soil Conservation

Title: Storm Sewer
Brief Description: A storm sewer carries intercepted surface runoff, street wash and other wash waters or drainage but excludes domestic sewage and industrial wastes, and thus reduces urban runoff pollution.
Reference: [1] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 552 -- 554. [2] Lager, J.A., Urban Stormwater Management and Technology, Update and Users Guide, 1977, pp. 48 -- 50.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Storm-Water Storage
Brief Description: In a combined sewer system (drainage combined with sanitary flow), storage facilities must be available to hold back storm waters and permit them to pass through the treatment system so gradually that they do not disrupt the biological treatment process.
Reference: [1] Hines, L.G., Environmental Issues, 1983, pp. 237 - 239. [2] Novotny, V. & Chesters, G., Handbook of Nonpoint Pollution: Sources and management, 1981, pp. 110 -- 113.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Stormwater Management Strategy
Brief Description: Examples of such strategy include control of infiltration and inflow, flushing pipe-lines to remove accumulated pollutants, injection of polymers to increase pipe-carrying capacity, preliminary quality and quantity control, etc.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 838. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 247 -- 248.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Stormwater Runoff Control
Brief Description: Measures to control stormwater runoff include: delays of runoff at source, infiltration of runoff at source, reduction of runoff and increase in infiltration after preliminary concentration.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 147 -- 148. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 253 -- 254.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Stormwater Runoff Treatment
Brief Description: Floating and suspended solids can be removed from stormwater runoff by use of trash racks, debris barriers, sediment ponds, screening, swirl concentrators, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 148 -- 149. [2] Lager, J.A. & Smith, W.G., Urban Stormwater Management and Technology: An Assessment, 1984, pp. 260 -- 290.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Strahler Model
Brief Description: When a drainage basin is devegetated, the channel network expands, resulting in increased erosion in much of the basin and sedimentation along the main channel.
Reference: [1] Mather, A. S., Land Use, 1986, pp. 150 -- 151. [2] Platt, R.H., McMuller, M.G., Paton, R., Patton, A., & Grahek, M., Intergovernmental Management of Floodplains, 1985, pp. 187 -- 188. [3] Kuiper, E., Water Resources Development, 1975, pp. 304.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Strategy in Planning Improvement
Brief Description: Improvements in environmental planning must be made in terms of clearer goals, policy integration, improved local participation, improved information system, integrating economic and environmental decisions, systematizing analyses of institutional mechanisms, and understanding new values.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 1005 -- 1009. [2] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 184 -- 186.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Strategy of Evapotranspiration Reduction
Brief Description: Four techniques can be used to reduce evapotranspiration losses by farming and forestry practices: remove/replace/thin the existing vegetation cover; apply transpiration suppressants; develop less-transpiration plants; grow plants in an enclosed structure.
Reference: [1] Mather, J.R., Water Resources, 1984, pp. 223 -- 245. [2] Swenson, H.A. & Baldwin, H.L., A Primer on Water Quality, 1975, pp. 27 -- 41. [3] Toubier, J. & Westmacott, R., Water Resources Protection Measures in land Development -- A Handbook, 1984, pp. 286.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Stream Bank Protection
Brief Description: A soil conservation tool. Preservation or planting of native vegetation along waterways can reduce water pollution from runoff. The vegetation filters debris and sediment in runoff, provides wildlife habitat and shade, and the roots bind and hold the soil layers.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 176 -- 177. [2] Brown, W.M., Hines, W.G., Rickett, D.A., & Beach, G.L., A Synoptic Approach for Analyzing Erosion as a Guide to Land-Use Planning, 1979, pp. 291 -- 292.
Key Words: Active/Passive, Stable/Unstable
Subject: Soil Conservation

Title: Stream Buffer
Brief Description: The role of the stream buffer, defined as all land lying within 300 feet of all streams and swales, is to prevent many of the harmful effects of urban development from reaching the stream network.
Reference: [1] Strong, A.L. & Keene, J.C., Environmental Protection through Public and Private Development Controls, 1983, pp. 15. [2] James, L.D. & Lee, R.R., Economics of Water Resources Planning, 1981, pp. 256 -- 259.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Stream Classification System
Brief Description: Methods employed in stream classification include the following elements: evaluation of stream flows and variations, summary of stream water quality data, compiling information on current uses, mechanisms for public input to the process, etc.
Reference: [1] Lamb, J.C., Water Quality and its Control, 1985, pp. 246. [2] Gehm, H.W. & Bregman, J.I., Handbook of Water resources and Pollution Control, 1976, pp. 130 -- 132.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Stream Corridor Dedication
Brief Description: Subdivision regulations can be used to encourage dedication of stream corridors to provide buffers of natural vegetation between new development and streams feeding the water supply impoundment.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 175. [2] Kusler, J.A., Regulating Sensitive Lands, 1980, pp. 156 -- 160.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Stream Environment Zone
Brief Description: A required land strip on each side of the stream bed necessary to maintain existing water quality, its width determined by the condition of the soil, vegetation and land slope.
Reference: [1] Lemay, J. & Harrison, E., Environmental Landuse Problems, 1984, pp. 52. [2] Kusler, J.A., Regulating Sensitive Lands, 1980, pp. 156 -- 160. [3] Black, P.E., Conservation of Water and Related Land Resources, 2nd ed, 1988, pp. 245 -- 256.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Stripcropping
Brief Description: Rowing crops in a systematic arrangement of strips or banks to reduce water and wind erosion, including contour stripcropping, field stripcropping, wind stripcropping.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 154 -- 155. [2] Haith, D.A. & Raymond, C.L., Effectiveness of Soil and Water Conservation Practices for Pollution Control, 1979, pp. 120 -- 121.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Subdivision Regulation Strategy
Brief Description: Subdivision regulations must define necessary street sizes, water pipe sizes, location of sewer outlets, grading and erosion control requirements, bicycle path dedications, parking requirements, and landscaping requirements.
Reference: [1] Caves, R.W., Land Use Planning, 1992, pp. 31. [2] Thurow, C., Toner, W., & Early, D., Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators, 1985, pp. 194 -- 197.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Summerkill Prevention
Brief Description: The methods for preventing summerkill of lake fish include: lowering water temperatures through shading of the water, providing deeper water per unit of surface area, reducing the amount of organic material in the water.
Reference: [1] Cadieux, C.L., Wildlife Management on Your Land, 1985, pp. 203. [2] NWF, Gardening with Wildlife, 1984, pp. 199 -- 200. [3] Burger, G.V., Practical Wildlife Management, 1990, pp. 151 -- 152.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Surface Water Supply Evaluation
Brief Description: The elements that must be analyzed in evaluating surface water supplies include: activity patterns on the watershed, pollution loads, surface runoff, groundwater infiltration, exposed population, water treatment/distribution systems, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 5, 83. [2] Skidmore, O. & Merrill, Assessment and Recommendations for Community Water Resources Planning, 1980, pp. 143 - 145.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Surface Water Treatment
Brief Description: The types of treatment used in public water supplies from surface water include: chlorination, sedimentation/coagulation, sand filtration, pressure filtration, iron removal, softening by lime, etc.
Reference: [1] Lamb, J.C., Water Quality and its Control, 1985, pp. 246. [2] Durfor, C.N. & Becker, E., Public Water Supplies of the 100 Largest Cities in the United States, 1974.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Target Sources Classification
Brief Description: Target pollutant/activity sources can be classified by type of land use, or couched along other dimensions such as population level, employment level, area of impervious surface, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 129 -- 132. [2] Goldman, M.I., Controlling Pollution, 1977, pp. 237 -- 240.
Key Words: Comfortable/Uncomfortable, Polluted/Unpolluted
Subject: Environmental Pollution Control

Title: TELLUS System
Brief Description: TELLUS is a computer-aided methodology, current implemented in Santa Clara County in California, which facilitates comparison of the environmental consequences of physical alternatives considered during public works project design.
Reference: [1] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 58 -- 59. [2] Warner, L. & Preston, E., A Review of Environmental Impact Assessment Methodologies, 1984, pp. 238 -- 240.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Terracing
Brief Description: A soil conservation tool. Building steplike terraces on steep slopes can reduce soil erosion.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 177. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, pp. 864. [3] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 155.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Tertiary Sewage Treatment
Brief Description: As an advanced waste water treatment, it refers to the additional processes used after conventional biological treatment to achieve greater removal of pollutant constituents. Examples are distillation, electro dialysis, lagooning, filtration, etc.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 180. [2] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 536 -- 542. [3] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 634.
Key Words: Polluted/Unpolluted, Safe/Hazardous
Subject: Water Pollution Control

Title: Tezuka Compression System
Brief Description: This innovative solid waste management method was developed in Japan which compacts refuse at high pressures into bales suitable for land reclamation or for construction.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 78 -- 79. [2] Pavoni, J., Handbook of Solid Waste Disposal: Materials and Energy Recovery, 1975, pp. 417 -- 419.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Tooling Up
Brief Description: Tooling up is the first step in formulating and implementing an environmental management program. It involves gathering together the staff support and financial resources needed.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 195 -- 200. [2] Seneker, C.J., Land Use Regulations for Urban Growth Control, 1984, pp. 259 -- 262.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: Totality Indices
Brief Description: Totality indices, composite impact scores, developed by Odum, can express all environmental impacts quantitatively in a form that can be aggregated.
Reference: [1] Roberts, R.D., Planning and Ecology, 1984, pp. 89. [2] Munn, K.H., Environmental Impact Assessment, 2nd edition, 1979, pp. 143 -- 145. [3] Warner, L. & Preston, E., A Review of Environmental Impact Assessment Methodologies, 1984, pp. 260.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Transferable Development Certificate
Brief Description: As a certificate of development rights, it is given to people who earn property in the preservation zone and can be sold to other people who want to develop property in a developable area. This brings the community both adequate open space and more housing.
Reference: [1] Lemay, J. & Harrison, E., Environmental Landuse Problems, 1984, pp. 172. [2] Mather, A. S., Land Use, 1986, pp. 235. [3] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 181 -- 182.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Transfer Station
Brief Description: A transfer station is an innovative economic refuse management method and is very useful in a metropolitan area because it is neatly dustless and odorless in operation.
Reference: [1] Robinson, W.D., The Solid Waste Handbook: A Practical Guide, 1986, pp. 569 -- 574. [2] Berry, B.J.L. & Horton, F.E., Urban Environmental Management, 1984, pp. 272 -- 273.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Treatment of Stormwater
Brief Description: as Treatment processes of stormwater may be physical such as sedimentation, dissolved air flotation, screening, filtration, and swirl concentration or biological such as high rate trickling filtration and various types of oxidation lagoons.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 838. [2] Vitale, A.M. & Sprey, P.M., Total Urban Water Pollution Loads, 1974.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Trickling Filter
Brief Description: Trickling filter process is a sewage-treatment approach to achieve the decomposition of organic wastes. A trickling filter is a large bed of crushed stone, gravel, or slag coated by a transparent film of microbes. It requires a large area for its operation.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 177 -- 178. [2] Hines, L.G., Environmental Issues, 1973, pp. 231. [3] Viessman, W.Jr. & Welty,C., Water management, 1985, pp. 531 -- 533.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Two-District Floodplain Zoning
Brief Description: The general approach is to divide the flood hazard area into a Floodway District and a Floodway Fringe District. Land use restrictions are very different of these two districts.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 973 -- 974. [2] Platt,R.H., McMuller,M.G., Paton,R., Patton,A., & Grahek,M., Intergovernmental Management of Floodplains, 1985, pp. 321 -- 322.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: University Park system
Brief Description: A system to maximize plant growth and ground water recharge was designed at University Park, Pennsylvania, using treated waste water effluent. Here optimal rates of effluent application were determined empirically for several types of vegetation.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 514. [2] Thomas,R.W., Land Disposal II: An Overview of Treatment Methods, 1983, pp. 279 -- 281.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Urbanization Effects on Floodplain
Brief Description: Urbanization lowers the surface infiltration capacity, which leads to suppression of natural surface flow into subsurface conduits and the addition of new, artificial flow systems, and the flood peak is thus higher and sooner.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 158 -- 160. [2] Platt,R.H., McMuller,M.G., Paton,R., Patton,A., & Grahek,M., Intergovernmental Management of Floodplains, 1985, pp. 283 -- 290.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: USDA Method
Brief Description: A popular land capability classification technique employed in land-use planning. The method is based on the concept of limitations to land use imposed by land characteristics.
Reference: [1] Mather, A. S., Land Use, 1986, pp. 213 -- 214. [2] Klingebiel, A.A. & Montgomery, P.H., Land Capability Classification, 1983, pp. 180 -- 185. [3] Erwin, D.E., Land Use Control, 1977, pp. 74 -- 76.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Utilization of Soils Data
Brief Description: Soils data can be used in land appraisal and assessment; in cost estimates for development proposals, street and highway location, storm water drainage design, and specific site selection; and in the preparation of neighborhood unit development plans.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 483. [2] Haith, D.A. & Raymond, C.L., Effectiveness of Soil and Water Conservation Practices for Pollution Control, 1979, pp. 350 -- 351.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Vector Control
Brief Description: In sanitary landfills, vectors of diseases can be controlled through daily cover of at least 6 inches of soil and cover of at least 1 foot for areas to remain undisturbed for longer periods if the waste and soil are properly compacted.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 772 -- 773. [2] Noble, G., Sanitary Landfill Design Handbook, 1976, pp. 176 -- 179.
Key Words: Healthy/Sick, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Vegetation as Environmental Indicators
Brief Description: Divergent plant species and vegetation associations do indicate different environmental conditions. Specific locations of local plant patterns are usually responses to geological, soil, slope-exposure, drainage, and previous land use conditions.
Reference: [1] Marsh, W. M., Environmental Analysis, 1978, pp. 128 -- 132. [2] Blacksell, M., Landscape Protection and Development Control, 1979, pp. 21. [3] Williamson, R.M. & Currier, W.F., Applied Landscape Management in Plant Control, 1981, pp. 13.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environment Assessment

Title: Vegetation Selection In Erosion Control
Brief Description: The criteria of vegetation selection for erosion control concern such parameters as fertility, moisture, season, form, height, texture, longevity, etc.
Reference: [1] Blacksell, M., Landscape Protection and Development Control, 1979, pp. 21. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 587 -- 588.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Vegetation Selection in Land Treatment
Brief Description: The selection of the vegetative cover to be utilized on a waste water land application site will depend upon many factors. The primary choices include annual and perennial agricultural crops and forest vegetation.
Reference: [1] Thomas, R.W., Land Disposal II: An Overview of Treatment Methods, 1983, pp. 172 -- 174. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 642 -- 646.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Vermont's Quasi-Judicial Environmental Board System
Brief Description: This is a unique and innovative administrative mechanism to deal with environmental matters. One State Environmental Board and nine District Environmental Commissions serve as a quasi-judicial body with the authority to issue land use permit.
Reference: [1] Magazine, A. H., Environmental Management in Local Government, 1977, pp. 37 -- 39. [2] Henning, D.H., Environmental Policy and Administration, 1984, pp. 204 -- 206.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Walworth Approach to Agricultural Zoning
Brief Description: Walworth County (WI) ordinance has 26 separate use districts including 5 agricultural zones delineated on large-scale zoning base maps. The permitted use of each parcel of agricultural land is predesignated rather than requiring a case-by-case determination.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 964 -- 965. [2] SWRPCN, Walworth County Rezoning Nears Completion, 1976. [3] Caves, R.W., Land Use Planning, 1992, 249 -- 250.
Key Words: Organized/Chaotic, Private/Public
Subject: Land Use Planning

Title: Waste Application Site Selection
Brief Description: General factors to be considered in site selection for waste application include quantity of waste, transportation, competing land use, aesthetics, soils, geology, water quality, and public acceptance.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 766 -- 770. [2] Herriman, R.C., Soil and Landscape Factors in Siting Sanitary Landfills, 1982, pp. 49 -- 52.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Waste Disposal Program
Brief Description: A successful waste disposal program requires an initial assessment of local air/water/land resources and the waste product; monitoring of changes in soil, plant, air and water quality; establishment of research grants; and education of the public.
Reference: [1] Noble, G., Sanitary Landfill Design Handbook, 1976, pp. 8 -- 12. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 628 -- 629. [3] PDER, Solid Waste Management, 1981, pp. 15.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Water Pollution Control

Title: Waste Water Applications in Forest Ecosystems
Brief Description: Forest land represents a great potential for recycling municipal waste water, due partly to the high infiltration and permeability of the soil generally found in established forests.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 646 -- 657. [2] Thomas, R.W., Land Disposal II: An Overview of Treatment Methods, 1983, pp. 172 -- 174.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Water Aeration
Brief Description: Aeration, the injection of air into water to increase its free oxygen, is an innovative, low-cost water-pollution abatement technique.
Reference: [1] Hines, L.G., Environmental Issues, 1983, pp. 239. [2] Lamb, J.C., Water Quality and its Control, 1985, pp. 270 -- 272. [3] Gehm, H.W. & Bregman, J.I., Handbook of Water Resources and Pollution Control, 1976, pp. 230 -- 233.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Water Development
Brief Description: Construction of small watering structures to provide drinking water for wildlife, includes guzzlers, spring developments, dugouts, and catchment basins.
Reference: [1] US Dept of Agriculture, Wildlife and Fish Habitat Management in the Forest Service, 1983, pp. 128. [2] Burger, G.V., Practical Wildlife Management, 1990, pp. 209 -- 211. [3] Cadieux, C.L., Wildlife Management on Your Land, 1985, pp. 234.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Waterfowl Management
Brief Description: Waterfowl management includes: hunting/harvest regulations (fixed bag limit or point bag regulation, lead shot prevention), infectious disease control, habitat management (artificial stocking), and predator control.
Reference: [1] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 325 -- 332. [2] U.S. DOI, Concept Plan for Waterfowl Habitat Protection, 1988, pp. 30 -- 56. [3] Gabrielson, I.N., Wildlife Conservation, 1973, pp. 175 -- 183.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Water Harvesting Strategy
Brief Description: Methods of sealing the soil surface aimed at water harvesting range from paving the watershed with asphalt, to lining catchment areas with plastic or neoprene covers, to chemical sprays and soil sealants.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 126. [2] Medina, J., Conversion in Arid and Semi-Arid Zones, 1976, pp. 61 -- 72. [4] Kuiper, E., Water Resources Development, 1975, pp. 99 -- 102.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Water Impoundments
Brief Description: Water impoundments increase habitat utilization and provide drinking water, nesting or wintering areas for a variety of animals. They can be constructed by digging and blasting and by small dams made with rock, soil, or vegetation.
Reference: [1] Bookout, T.A., Wildlife Management Techniques Manual, 1991, pp. 243 -- 246. [2] Billings, W.D., Plants and the Ecosystem, 1975, pp. 193 -- 195. [3] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 139 -- 140.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Water-Induced Soil Erosion Control
Brief Description: In rural areas, the measures hindering water-induced soil erosion include: conservation tillage, cross-slope tillage, terraces, strip-cropping, contour cultivation, grassed waterways, vegetative buffer-strips, crop rotations, diversion, etc.
Reference: [1] Ryding, S.O., Environmental Management Handbook, 1992, pp. 323 -- 324. [2] Burton, M.A.S., Biological Monitoring of Environmental Contaminants, 1986, pp. 250 -- 253.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Water Quality Assessment
Brief Description: Types of water quality assessment include: multipurpose monitoring, trend monitoring, basic survey, operational surveillance, background monitoring, impact survey, modelling survey, early warning surveillance, emergency survey, etc.
Reference: [1] Chapman, D., Water Quality Assessments, 1992, pp. 19 -- 29. [2] Gehm, H.W. & Bregman, J.I., Handbook of Water Resources and Pollution Control, 1976, pp. 152 - - 154. [3] Whitlow, S.H., Water Quality Assessment in Canada, 1985, pp. 75 -- 79.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Water Quality Degradation Prevention
Brief Description: Public measures effective in preventing water quality degradation include: conduct sanitary surveys to detect pollution sources, provide technical assistance, regulate watersheds to prevent pollution, acquire water supply watershed land for open space, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 65 -- 68. [2] Clark, J.W., Water Supply and Pollution Control, 3d ed., 1977, pp. 117 -- 120.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Water Quality Standards
Brief Description: The standards used in water quality control include design standards -- facilities, performance standards -- end result, and procedural standards -- methods.
Reference: [1] Lamb, J.C., Water Quality and its Control, 1985, pp. 246. [2] Lamb, J.C., Effluent and Stream Standards - - A Rational Approach, 1983. [3] Gehm, H.W. & Bregman, J.I., Handbook of Water Resources and Pollution Control, 1976, pp. 179 -- 184.
Key Words: Polluted/Unpolluted, Wet/Dry
Subject: Water Pollution Control

Title: Water Resources Management Strategy
Brief Description: The strategies include issuing permits for water withdrawal or diversion, registering water rights claims, regulating hydroelectric projects, controlling storm water runoff, Setting standards for water-well drillers, etc.
Reference: [1] Haskell, E.H. & Price, V.S., State Environmental Management, 1983, pp. 83 -- 84. [2] Knox, K.M., Landscaping for Water Conservation, 1989, pp. 34 -- 38.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Water Resources Plan
Brief Description: In general, a water resources plan deals with: the availability of water, amount and timing of water use, the environmental impacts of various water uses, constraints on water management, prevailing legal and social patterns, and local water policies.
Reference: [1] Viessman, W.Jr. & Welty, C., Water Management, 1985, pp. 115 -- 120. [2] James, L.D. & Lee, R.R., Economics of Water Resources Planning, 1981, pp. 128 -- 130. [3] Clark, J.W., Water Supply and Pollution Control, 3d ed., 1977, pp. 16 -- 18.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Water Resources Protection District
Brief Description: A water resources protection district includes all of the flood plain, stream buffer, woodlands, and slopes land in the watershed, whose land use restrictions should limit development density, restrict impervious cover, and provide for hardship situations.
Reference: [1] Strong, A.L. & Keene, J.C., Environmental Protection through Public and Private Development Controls, 1983, pp. 16 -- 17. [2] James, L.D. & Lee, R.R., Economics of Water Resources Planning, 1981, pp. 153 -- 154.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Watershed Protection Strategy
Brief Description: Local government watershed protection measures include: land acquisition, special ordinances, critical areas designation/regulation, zoning/subdivision regulations, agricultural soil conservation, erosion control ordinance, etc.
Reference: [1] Burby, R.J., Kaiser, E.J., Miller, T.L., & Moreau, D.H., Drinking Water Supplies, 1983, pp. 56 -- 60. [2] Toubier, J. & Westmacott, R., Water Resources Protection Measures in Land Development -- A Handbook, 1984, pp. 204 -- 220.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Watershed Restoration Measures
Brief Description: Watershed restoration measures include revegetation measures (such as seeding, tree planting, and application of fertilizer and mulches) and structural measures (such as regrading, diversions, contour furrows, and terraces).
Reference: [1] Miller, L. & Burby, R.J., Protecting Drinking Water Supplies through Watershed Management: A Case Book for Devising Local Programs. [2] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 797 -- 798.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Watershed Self-Purification Capability Maintenance
Brief Description: Feasible measures to optimizing the self-purification capability of watershed include: restoration of wetlands, introduction of buffer zone close to watercourses, increased overland flow treatment, minimization of the use of sub-surface drainage water, etc.
Reference: [1] Ryding, S.O., Environmental Management Handbook, 1992, pp. 325 -- 326. [2] Gehm, H.W. & Bregman, J.I., Handbook of Water resources and Pollution Control, 1976, pp. 123 -- 125.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Water Supply Adequacy Analysis Model
Brief Description: This model is based on the concept of a balance between water use and water supply and takes into consideration both groundwater and fresh surface water and provides a subregional analysis for each of the water resources regions and subregions.
Reference: [1] Goodman, A.S., Water Resources Planning, 1984, pp. 178 -- 180. [2] Schwartz, S.I., Johnston, R.A., Blackmarr, J.R., & Hansen, D.E., Controlling Land Use for Water Management and Urban Growth Management: A Policy Analysis, 1979, pp. 385 -- 388.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: Waterwall Incinerator
Brief Description: The most popular incineration and recovery system for solid waste management. It produces steam in pipes in the side walls, and modular incinerators, which capture heat from the exhaust gases.
Reference: [1] Baldwin, J. H., Environmental Planning and Management, 1985, pp. 209. [2] Jackson, F.R., Energy from Solid Waste, 1979, pp. 108 -- 110.
Key Words: Matter/Non, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Water Yield Management
Brief Description: Water yield management techniques include removal of forest cover, conversion of deep-rooted brush species to shallow-rooted grasses and shrubs, removal of higher water users from along water courses and flood plains, reducing water intake by soils, etc.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 798 -- 799. [2] Ffolliott, P.F. & Thorud, D.B., Vegetation Management for Increased Water Yield in Arizona, 1974, pp. 166 -- 168.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: WATSTORE System
Brief Description: The national Water Data Storage and Retrieval (WATSTORE) system is to make basic hydraulic data available for assessing the occurrence, quantity, quality, distribution, and movement of surface and ground water in the United States.
Reference: [1] Beatty, M.T., Petersen, G.W., & Swindale, L.D., Planning the Uses and Management of Land, 1978, pp. 129 -- 130. [2] Tourgier, J.T. & Westmacott, R., Water Resources Protection Technology, 1981, pp. 82 -- 105.
Key Words: Stable/Unstable, Wet/Dry
Subject: Water Resource Conservation

Title: WBS Method
Brief Description: A work-breakdown structure (WBS) is a top-down formulation of how the tasks of an environmental program fit into the overall program structure. It is an important planning tool because it serves as the basis of the program schedule.
Reference: [1] Brill, A.E., Techniques of EDP Project Management, 1984, pp. 186 -- 187. [2] Frame, J.D., Managing Projects in Organizations, 1988, pp. 164 -- 166. [3] Davies, C., Organization for Program Management, 1979, pp. 216 -- 218.
Key Words: Intellect/Non, Nicely Shaped/Poorly Shaped
Subject: Environmental Management

Title: West Sussex Method
Brief Description: This technique is used to assess ecological quality of a study area. Emphasis is placed on the presence of areas of semi-natural vegetation. In this method, fifteen types of habitat are given numerical scores.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 73 -- 74. [2] Roberts, R.D., Planning and Ecology, 1984, pp. 187 -- 188. [3] Warner, L. & Preston, E., A Review of Environmental Impact Assessment Methodologies, 1984, pp. 278 -- 281.
Key Words: Good/Bad, Informed/Uninformed
Subject: Environmental Assessment

Title: Wet Separating Processing
Brief Description: This is a combined processing-recycling system which is able to dispose of solid waste and wastewater treatment plant sludge while recovering such usable materials as metals, paper and glass.
Reference: [1] Rimberg, D., Municipal Solid Waste Management, 1975, pp. 78 -- 81. [2] Jackson, F.R., Energy from Solid Waste, 1979, pp. 199 -- 201. [3] PDER, Solid Waste Management, 1981, pp. 70 -- 71.
Key Words: New/Old, Polluted/Unpolluted
Subject: Solid Waste Management

Title: Wildlife Habitat Improvement
Brief Description: Activities to increase the capability to meet the needs of wildlife include: prescribed burning to stimulate forage, water developments, installing nesting structures, control of vehicle access, brush cutting, creation of openings, etc.
Reference: [1] US Dept of Agriculture, Wildlife and Fish Habitat Management in the Forest Service, 1983, pp. 7 -- 10. [2] Burger, G.V., Practical Wildlife Management, 1990, pp. 150 -- 151. [3] Usher, M.B., Wildlife Conservation Evaluation, 1986, pp. 304 -- 312.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Wildlife Management
Brief Description: People manage wildlife resources by means of managing habitat, managing people, and managing the individuals in a population by allowing them to increase, decrease, or remain constant. Approaches used include preservation, conservation and manipulation.
Reference: [1] Anderson, S.H., Managing our Wildlife Resources, 2nd ed., 1991, pp. 1 -- 5. [2] Gabrielson, I.N., Wildlife Conservation, 1983, pp. 2 -- 7. [3] Leopold, A., Game Management, 1983, pp. 9 -- 17.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Wildlife Preferred Trees
Brief Description: Wildlife preferred trees include: autumn olive, osage orange, jack pine, eastern red cedar, sumac, blackberry, Russian olive, multiflora rose, silver maple, black walnut, pecan, oaks, conifers, green ash, nanking cherry, wild plum, dogwood, etc.
Reference: [1] Weiner, M.A., Plant a Tree, 1975, pp. 186 -- 210. [2] Cadieux, C.L., Wildlife Management on your Land, 1985, pp. 296 -- 300. [3] Burger, G.V., Practical Wildlife Management, 1990, pp. 245 -- 250.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Wind-Induced Soil Erosion Control
Brief Description: In rural areas, the measures hindering wind-induced soil erosion include: wind barriers, shelter belts, stubble mulch, conservation tillage, cover crops, crop rotations, land forming, bench terracing, etc.
Reference: [1] Ryding, S.O., Environmental Management Handbook, 1992, pp. 322. [2] Burton, M.A.S., Biological Monitoring of Environmental Contaminants, 1986, pp. 250 -- 253. [3] Held, R.B. & Clawson, M., Soil Conservation in Perspective, 1975, pp. 94 -- 98.
Key Words: Stable/Unstable, Wealthy/Poor
Subject: Soil Conservation

Title: Winterkill Prevention
Brief Description: Methods for avoiding winterkill of pond fish include: stretching a long plastic hose along the bottom of the lake; using a raft-mounted windmill to suck water up from the bottom of the lake; slowing the inevitable process of eutrophication, etc.
Reference: [1] Cadieux, C.L., Wildlife Management on Your Land, 1985, pp. 202 -- 203. [2] Burger, G.V., Practical Wildlife Management, 1990, pp. 150 -- 151. [3] Giles, R., Wildlife Management, Techniques, 1990, pp. 230 -- 231.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

Title: Woodland Management Plan
Brief Description: In a woodland management plan, 4 aspects must be stated: the nature of the woodland (age structure and species), its visual contribution to the landscape, the desired uses of the woodland, and the resources available for its management.
Reference: [1] Lovejoy, D., Land Use and Landscape Planning, 1979, pp. 144 -- 145. [2] Davidson, D.A., Soils and Land Use Planning, 1980, pp. 124 -- 127. [3] Kusler, J.A., Regulating Sensitive Lands, 1980, pp. 54 -- 55.
Key Words: Active/Passive, Stable/Unstable
Subject: Land Resource Conservation

Title: Woodlot Management as Wildlife Habitats
Brief Description: Management methods of woodlots as wildlife habitats include: allowing hardwoods to mature as den sites, fencing livestock outbordering tree lots with tall grass cover, providing water in close proximity to woodlots, etc.
Reference: [1] Septic, Owen, & Coulter, Landowner's Guide to Woodlot Management in the Northeast, 1985, pp. 253 -- 278. [2] Cadieux, C.L., Wildlife Management on Your Land, 1985, pp. 300 -- 301.
Key Words: Natural/Artificial, Stable/Unstable
Subject: Ecological Protection

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