

BASIC PRINCIPLES FOR RIGHT OF WAY VEGETATION MANAGEMENT
NEAR HUMAN SETTLEMENTS

M. R. GARDNER

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ABSTRACT

This paper attempts to reduce the principles of vegetation management on rights of way in urban areas to a manageable and readily understood form while retaining the essential elements which comprise an integrated management program. The trend towards urban living is discussed with examples. The consequent growth of electrical systems is outlined and the problems of underground transmission reviewed briefly. The implications of increasing electrical voltages and land use demands is examined in the context of vegetation control on rights of way with comprehensive examples. External political and internal bureaucratic influences on program planning are suggested. Schematic reviews are made of the principal components of plant growth and control, and management methods. It is concluded that management techniques have not kept pace with technological development since adequate training in and elucidation of management principles is not readily available.

INTRODUCTION

One of the most significant trends of the mid-twentieth century is the rush from the countryside to the city, a headlong urbanization that is creating serious problems for all countries, developed and undeveloped (Ward 1964). Most people in North America and Western Europe are probably aware that something fairly drastic is happening to their cities. They grow. They congest. The modern economic system is overwhelmingly urban. Economic factors; patterns of transport, concentrated labour markets, quick communication, access to suppliers, minimum costs in getting goods to consumers has set the trend to large urban concentrations in motion and, once it has started, the apparent conveniences of largeness make the areas larger still. And as the world's population has moved onward to a rate of growth of some two percent a year, the stream of aspiring humanity has now become a flood. Urban population grows at twice the general rate, and big cities grow faster still. Some of the largest are growing by eight percent a year. For example with a medium migration flow, the population forecast to the year 2006 indicates that the population of British Columbia will double and that the majority of that increase will be in the City of Vancouver (B.C.E.C. 1974). As the fabric of our society changed and the cities grew, each conurbation needed more energy to support the new life; energy to work by and energy to rest by. Electricity, clean and inexpensive, became an attractive energy form to satiate that demand until today it represents about 25 percent of all energy consumed in North America. Present predictions indicate an increase to 43 percent by 1990. The per capita demand for this form of energy has been growing five times faster than the population. With the growth of load has come, for most utilities, a exhaustion of

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TASK RATIONALE

The development of a comprehensive task rationale should underlie the development of any vegetation management program, for it prescribes the framework from which all basic decisions are derived.

Where all tasks today must compete for operating finance, it provides the factors in judgement of Priorities and allocation of funds. Objectives for Management which should form the operating outline for Divisional and Department level tasks obtain from an assessment of each Problem. These objectives are then set out as a Management Plan for the comprehensive and orderly treatment of each problem as the need occasions. Task Intensity: that is the degree or extent to which any task will be undertaken, under what circumstances, and to what detail and quality, will be outlined in the management plan. It is from this document that individual Staff Responsibilities are also evolved. These may be further detailed in a Job Description for each Job Title. A further reason for a clearly developed rationale is one of community relations. Today's skepticism of all large concerns and their modus operandi is prevalent both by the general public and within all levels of government. Rabid condemnation of right of way managers is not uncommon. (Van. Sun 1975). Without a clear purpose for each task fully justified, the right of way manager forsakes an essential element in a successful program package.

The problems encountered in an urban setting are both more diverse and complex, with the solutions subject to greater public scrutiny and concern. For an electrical utility as with most other right of way users, there are three basic reasons for controlling vegetation; safety, security and access. Electrical clearance of some five meters for 500 KV and 3.6 meters for 230 KV is required at a point of maximum sag of the conductor between towers in order to preclude the possibility of an arc to earth or "flashover" via the vegetation. This factor must also recognize the influence of wind both on the conductor and on tall growing vegetation, and governs the control of vegetation both on the periphery of the right of way and also immediately below the conductor.

The requirement for system security: that is an uninterrupted supply of power, has both technical and social complications. Loss of major transmission lines for any reason may require load shedding, interruption to customers, and possible alternate sources of generation. This is especially true in areas where Hydro generation is far distant from the load centre and the alternate is operation of a backup oil-fired station with penalties of oil cost and air pollution.

The third basic reason for general vegetation control is that of access maintenance for civil and electrical surveillance of the line and, should the need arise, ready entry in case of emergency.

weed or tree invasion (Science Advisory Committee on Biocides 1974). Since it is biologically impossible to prevent rapid succession from early seral stages occurring on rights of way, it is necessary to utilize the natural resistance provided by native vegetation further along the successional cycle in order to maximize the time period between vegetation control treatments.

The choice of task method can and should be regulated by a realization that a method providing short term control, say two growing seasons, though providing cheaper initial cost is in fact more costly than an expensive method which provides control over five growing seasons. If the elapsed time in years before retreatment is required is divided into the accumulative job cost, a cost per unit per annum can be calculated. An obvious comparison here is between mechanical and chemical brush control costs and the relative effectiveness of control of each, the social and environmental considerations apart.

Measurements of vegetation are normally those of density, diameter, height, and area covered. Small areas, no matter the problem, can be readily managed, however, rights of way are unique as a land use covering hundreds of miles. Moreover, increases in width substantially increase area. For example, a six meter wide right of way 1.6 kilometers long encompasses one hectare, a 20 meter right of way 3.2 hectares, but 152 meter wide right of way 24.2 hectares. Higher line voltages and multiple lines because of technology limitations are becoming increasingly common to serve the continued load demands of large urban settlements. When further viewed in the light of manpower limitations imposed by union agreements, productivity variance, lost time and logistics, it can be seen that small increases in growth are magnified considerably as right of way length increases. It follows that it is incumbent on the aware and motivated manager to examine his methods and costs with great care as system expansion and environmental demands increase program size.

In order to fulfil the intent of this paper, the basic principles of management are furnished in schematic form. However, a prior understanding of external influences which exert various distortions on the ideal state must be recognized. I have chosen to call the first table the Hierarchy of Management Influences since the vegetation manager normally operates some considerable way down the organizational structure which in turn is in the sphere of government regulation either directly or indirectly. Understanding that each step up is one further away in appreciation of the direct problems faced by a vegetation manager may at least provide some solace to those constrained or beleaguered by some apparently unthinking bureaucrats. To further pervert the orderly transfer of communication up and down or across the hierarchy, factors of expediency prompted by fiscal constraints, political pressure, precedent, legal change and erratic interpretation of regulations, time, and organizational limitations may further modify the ideal plan.

Table 2. Synopsis of Operational Requirements

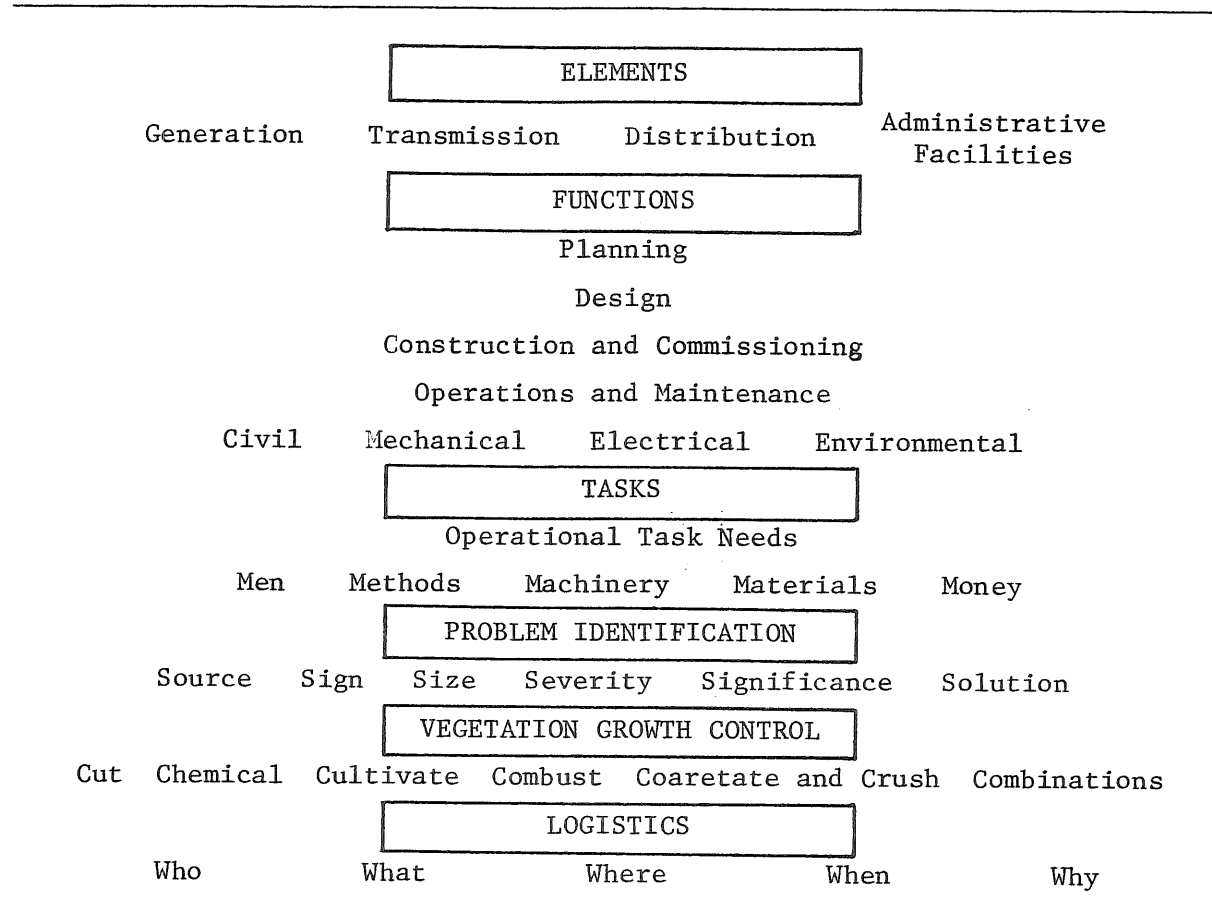
Appropriate Corporate Policy
Management Objectives
Workload and Equipment Inventory
Management Plan
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Updated Standards and Guidelines
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Data Collection and Analysis System
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By developing an assessment of each possible conflict, the program is further strengthened by this predictive capability which allows change to be made to the program as external circumstances change.

Table 3. Impact Matrix

		TOTAL ENVIRONMENT		
		Government	Company	Natural Environment
		civil	executive	air land water
		political	staff line	fauna / flora
				appearance
				use
Element Function Axis	Environmental Maintenance		area	
	Tasks - transmission		of effects	(impact)
		Impingement Axis		

Table 5. Electrical Utility Vegetation Management Schematic



It only remains to provide an outline of Workload Assessment which is no more than a predictive tool to assess cost in time and effort required to overcome the complete range of problems comprising the vegetation program. The assessment must provide and analysis of solutions as Task Methods, Controls and Records with a review of their relative capital cost and cost effectiveness. It must also calculate the effort in term of manhours which must be expended over time. Without such basic information it is neither possible to objectively assess present conditions nor to comprehensively plan for the future. Work and Manpower Scheduling and Program Budgeting also become readily visible with workload analysis; further, it provides baseline information allowing a vegetation manager to eventually compare current task productivity against planned targets of time and quantity (Gardner 1976).

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Pressure of land use on the urban environment will exert considerable influence on government, corporate and private institutions responsible for land and resource management. The emphasis will be on prescription maintenance; that is, the choice of maintenance technique best suited to a particular problem after examination of all influencing factors. The specialized training afforded most professionals today provides a comprehensive background of technical information. This, in turn, is supported by continuing research and development. Yet too little emphasis is placed on deriving the maximum benefit from these advantages while minimizing the impact of the Total Environment. Without a framework of management and an awareness of man, method and Mother Nature our progress will be slow and our land abused.

LITERATURE REFERENCES

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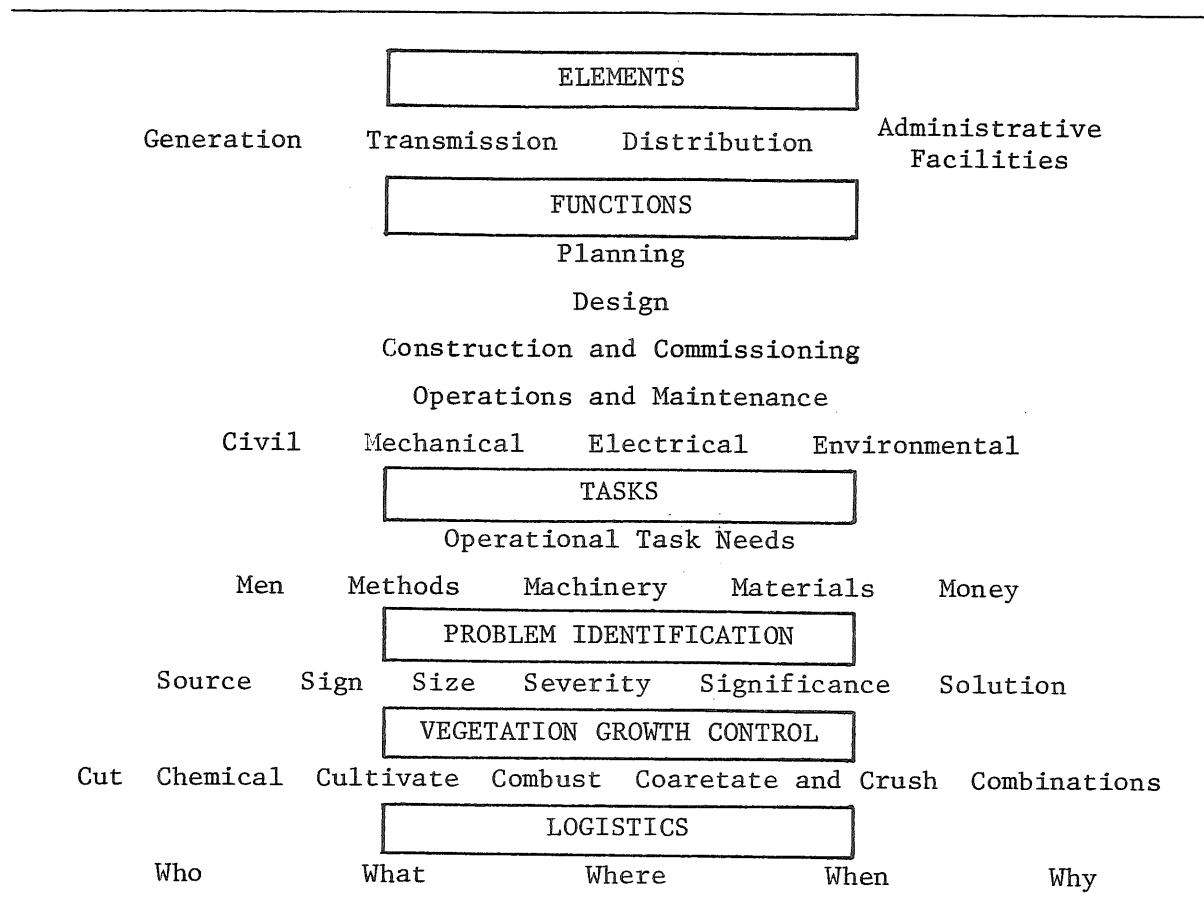
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