CHURCHES AT THE TRANSITION BETWEEN GROWTH AND WORLD EQUILIBRIUM

by Jay W. Forrester

This paper was originally presented at the annual meeting of the program board of the Division of Overseas Ministries of the National Council of Churches. It followed a discussion by Jørgen Randers showing the implications of present world trends in growth of population and industrialization, depletion of natural resources, rise in population, and full utilization of agricultural land. Referring to the two hours of his talk and the ensuing discussion, Randers said, "The entire purpose is to convince you that exponential growth cannot go on forever in a world of fixed size." Randers stressed that overtaxing of the natural environment is caused more by industrialization than by population. Industrial processes use natural resources and emit pollution. Capital-intensive agriculture in time decreases the productivity of land. Limiting of capital accumulation is as necessary as limiting of population. World civilization must and will move from growth to equilibrium, either by human choice or by the pressure of natural and social forces.

Many trade-offs and choices lie before us in the approaching equilibrium. We can press forward along the historical growth curves, exceed the limits of the world environment, and endure a collapse of population and industrialization back to a level the world can support. Or we can choose a redirection of law,

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> policies, and religions to create a smooth transition to world
> equilibrium. Even in choosing equilibrium, alternatives arise.
> The higher the population, the lower will be the achieveable
> standard of living and quality of life. Trade-offs will be made
> consciously or implicitly between advantages in the immediate
> future compared to advantages in the distant future. An in-
> herent conflict exists between time horizons. Choosing to max-
> imize the present quality of life condemns future generations to
> suffer for their predecessors' advantage.
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> The reader should, if possible, read first any of those cited in
> notes 1, 2, or 6 listed at the end of this paper before reading the
> following text. — JAY W. FORRESTER.

In recent studies of the dynamic behavior of corporations, cities, and
worldwide forces, many general and fundamental characteristics of
social systems have been identified. I was invited to interpret in this
paper the earlier work for its meaning to the churches, now that
population and industrial growth appear to be rapidly overtaking
the natural capacity of the earth.[1]

Civilization is in a transition zone between past exponential
growth and some future form of equilibrium. The nature of that
future equilibrium will depend on present actions. Present actions
are determined by the interplay between social forces and the value
system that governs our responses. If the churches are to be
influential, they will operate through the value system that condi-
tions our responses to the rising worldwide pressures. In studies of
other social systems, it has often been found that intended policies
lead to unintended consequences. Are the Christian churches propa-
gating an ethical value structure that is incompatible with a desirable
future condition of the world? Are the churches today acting in a
way that will improve or worsen the future of mankind? What is the
primary responsibility of the church in modern society? Be-
cause the short-term and long-term objectives are usually con-
tradictory, how is the balance to be struck? Should the church be
responsive to short-term pressures, or should it be the custodian of
the long-term values of a society? How is the church to resolve the
conflicting goals that are always to be found in a social system?

BACKGROUND

During the last fifteen years, new methods have become available for
understanding the behavior of social systems. By "social system," we
mean the interacting people, technology, laws, natural forces, and
ethical values that determine the evolution of a civilization. In-
teractions within our social systems produce baffling results. More

controversy than enlightenment often emerges from efforts to explain the course of human affairs. The confusion persists because our mental thought processes, although they have great strengths, have conspicuous weaknesses in understanding the complexities of social systems. But simulation of complex system behavior on a computer is effective in exactly the area where the human thought processes are weak. It is now possible to combine the power of the human mind with the power of the computer to achieve far deeper insights into the causes of social change and stress.

The new insights into social systems come from a methodology called "system dynamics." System dynamics is a body of theory and methods for clarifying and improving our mental models on which all actions are now based.[2] We make our decisions and operate our societies on the basis of mental images. Mental images are models that represent the real world in our thought processes. Mental models have great strength in their richness of detail. But mental models have two major weaknesses. First, the mental perceptions are not organized into the most relevant relationships. Second, the human mind is not well adapted for deducing the consequences of interactions between the known individual parts of a social system.

In system dynamics, a growing body of theory about the structure of multiloop feedback systems guides the organization of detail into the relevant structure.[3] The resulting structures are too complex for the mind to manage, so computer models are used to examine the implications of the assumptions that have been taken from our mental models. By this process, we begin to see the future consequences of present assumptions and actions. We also begin to see how action in one part of a social system can produce unexpected results in some very different dimension.

The concepts underlying system dynamics have evolved over the last hundred years. They apply to all systems that change through time, whether those systems are found in science, engineering, management, economics, politics, ethics, or combinations of the foregoing. Because the systems in science and technology are simpler than those in society, the methods were first developed in and applied to the technological areas. But now the power of the methods has grown to match the complexity of social systems.

The system-dynamics approach starts with the perceived cause-and-effect relationships taken from our mental models. In their totality, mental models contain far richer detail than has ever been reduced to writing. In turn, the written literature is far richer in concepts than the quantitative and statistical literature. All infor-

mation sources are used, in computer-model construction, to the extent that the sources contain effective inputs. But, of the available inputs, the mental models held by a group of perceptive individuals are usually the most nearly complete, diverse, and sensitive to the localized causal forces in a society. With rare and important exceptions, most of the written literature has already been filtered by an author through a nondynamic framework of perceptions so that the essential structure of dynamic behavior has been lost.

The localized cause-and-effect relationships describing the separate parts of a social system are selected and interconnected according to the principles of structure derived from the science of feedback systems. The result is a computer model that replicates the structure and assumptions taken from the mental models now being used for running our society. In the process, the assumptions become more explicit and better organized.

The resulting computer model then shows, without doubt, the dynamic consequences through time of the assumptions stated in the model. Often the consequences are unexpected. The computer model reveals the inconsistencies and contradictions that exist within the common mental models. Computer simulation shows how the fundamental assumptions that are accepted do not lead to the consequences that people presume.

Usually, the basic assumptions from existing mental models prove to be more nearly correct than the anticipated dynamic consequences. The human mind is better at observing local reaction to social and economic forces than in grasping the implications for the larger social system. Conversely, a computer cannot provide the social theory that is embodied in a model but can certainly generate the consequences of any specified assumptions.

From this new approach has come a better understanding of the industrial corporation, the growth and decline of cities, and the interaction of major worldwide social and technological trends. Regardless of the size of a social system, certain generalizations emerge that relate policies of a society to its behavior. Some of these generalizations apply to our ethical beliefs and religious teachings because these long-term guiding principles are part of the "policy" structure of a society. I have been asked to interpret our studies of social systems into their meaning for ethics, morality, and humanitarianism. Doing so should suggest questions and new lines of thought, not only for the overseas missions work of the National Council of Churches, but also concerning the place of the church in society.

The behavior of a social system depends on its structure and on the policies that govern decision making. By structure, we mean the interrelationships between components of the system and the channels of information available at a decision making point. By policy, we mean the criteria that determine how the available information is converted into decisions and action. Policy includes all rationale that influences how decisions are reached — experience, prejudice, folklore, ethics, religious attitudes, self-interest, generosity, integrity, and fear. Policy as used here also includes all the action-generating processes in science, biology, and nature.

System dynamics was first developed as a way to design corporate policy to improve the growth and stability of the industrial corporation.[4] In these corporate studies we first began to see the orderly processes by which the goals and values of an organization can influence its success. It also became clear that well-intentioned policies could often have unexpected and harmful results.

As a step to social systems beyond the corporation, system dynamics was used to examine the growth and decline of urban areas.[5] Again it was discovered that well-known relationships can interact to produce the observed puzzling behavor. The very actions being taken to help the cities — job-training programs, providing transportation to surburban jobs, financial subsidies from the federal government, and low-cost housing programs — can range from futile to harmful.

More recently, system dynamics has been used as the organizing philosophy to interrelate major social and technological forces on a worldwide scale.[6] As in other social systems, the trade-off compromises are acute. Alleviation of present world pressure is apt to be bought at the price of greater future distress. Treating a symptom may merely shift the pressure to some other aspect of society. Most important, the study of world interactions shows the impossibility of long-continued exponential growth in population and industrialization.

A system-dynamics computer model can accept any concept that can be explicitly stated in our normal written language. Such a model unifies diverse disciplines by integrating ethical, psychological, legal, geographical, technical, sociological, and economic aspects of a social system. The procedure is no more mechanistic and impersonal than any reduction of concepts to precise description. The procedure can deal with human and moral assertions, if precisely stated, as well as with the physical aspects of our existence.

Transition to World Equilibrium

A vast new set of ethical and moral dilemmas now faces man as humanity begins to encroach on the physical limits of the world. If exponential growth of population and industrialization were to continue at the present rate, the entire globe would be inundated in a few decades. Such growth is becoming progressively harder to sustain. Many of the political and economic stresses we are now experiencing can be traced to the clash of growth colliding with a fixed natural environment.

In all of the social systems that we have examined, from the simplest corporate subsystem to the most complex of world interactions, the great stresses and the great changes in social pressure come at the point where growth begins to slow down and equilibrium begins to be approached. It is during the transition period that turmoil is greatest. Humanity is now approaching the transition from worldwide growth to equilibrium. By equilibrium, we mean a condition of constant population, constant use of resources, and constant generation of pollution, all limited so that the equilibrium condition can be sustained indefinitely into the future. Equilibrium does not preclude a shifting composition within the constant level of world industrialization; equilibrium still allows changing cultural and ethical development in all dimensions that do not overload the natural environment.

As the world moves during the next several decades from exponential growth of population and industrialization into some form of equilibrium, we can expect rapidly growing social stresses of a magnitude, a distribution, and a diversity that have never before been encountered. As all world subsystems begin to reach their collective limits, they become much more highly interdependent. Internal mechanisms that have tended to equalize and redistribute individual stresses can no longer function and all parts of the system simultaneously encounter impenetrable limits. For example, international trade has redistributed resources and products so that the excesses at one point have been used to fill shortages at another. But, as growth continues beyond the equilibrium point, no excesses will remain. In retrospect, international trade will be seen as a means for continuing a nonsustainable world growth up to a time when all countries run out of all reserves at approximately the same time. International trade will have obscured the impending end of the growth phase until everyone faces the transition simultaneously in every facet of existence. The tendency is to relieve all pressures until

none can be suppressed. As a result, we will not have a long period of partial shortages to slow growth gradually. No areas of the world will encounter limits to growth ahead of other areas, so, as a result, mankind will not have the opportunity to learn on a small scale how to navigate the transition from growth to equilibrium. All will face the transition at about the same time and without benefit of a guiding precedent.

The change from the growth mode to the equilibrium mode is a major change in system behavior. During growth, pressures are relieved by expansion. The focus is on change. Problems are not solved but are overlooked in the excitement of conquest. But, in equilibrium, the new no longer dominates the old. Self-renewal must occur within a fixed size. The rules of thumb that served as policy in the growth mode no longer apply.

Figure 1 shows a set of feedback loops that produce growth, cause growth to impinge on a fixed space limit, and then shift dominant control to an equilibrium-seeking set of relationships. The figure is simple and illustrative and does not include the multiplicity of factors in an actual social system. But the missing factors also contain equilibrium limits so that the transition out of exponential growth must always eventually occur. In the figure, the upper loops produce growth. In an area with some fertile land, the population rises, people till the land and their labor increases the agricultural capability, the food per person increases, and the rising food supply supports further increase in population. This growth in population continues until the fertile land has been fully employed and the marginal productivity of an additional agricultural worker does not produce enough food to support the worker. The food per person falls until the population is held in equilibrium and stops growing. But the falling food per person produces distress and may trigger additional investment and more technology in agriculture. The investment and technology may come from within the system, or it may come in foreign aid from the outside. In either case, agricultural capability is pushed up further, food per person is again lifted above the subsistence level, and population continues upward. All of this assumes that nonagricultural aspects of crowding are still well below the national population limit set by other factors that will eventually restrain population. If food production continues to support a growing population, the population approaches the national population limit, crowding rises, population occupies the best agricultural land, and agricultural capability declines faster than it can be restored by investment and technology. Also at the same time
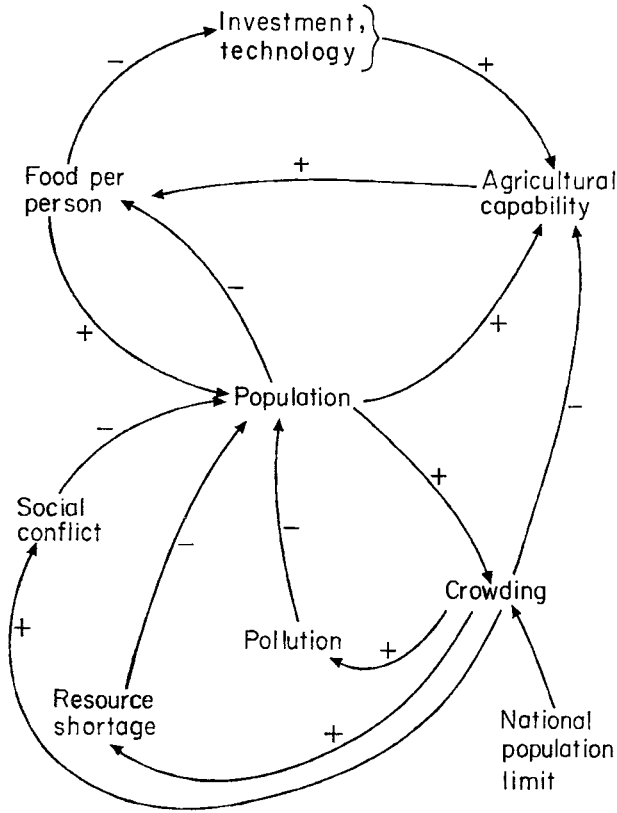
Fig. 1

crowding leads to other forces that limit population – pollution, re-source shortage, and social conflict, as well as disease and others. The upper loops have only a limited potential for generating growth. The consequence of growth is to induce ever-rising, growth-restraining forces in the lower loops. In time, the forces of growth and restraint come into balance and growth gives way to equilibrium. During the transition, the suppressive forces must and will rise as far as necessary to produce an ultimate equilibrium. The greater the growth forces that society sustains in the upper loops, the greater must and will become the restraining forces that develop in the lower loops.

Multiple pressures arise as the world reaches the limits of resource usage, agricultural production, pollution dissipation, and living space. As we attempt to alleviate these pressures by intensifying

agriculture, seeking resources on the ocean floor, constructing sky-scrapers, and building pollution-control equipment, we permit growth to continue. But growth rapidly consumes the gains from our efforts; the task of outrunning growth becomes harder and harder; and eventually the social-economic structure will become unsustainable. The forces of nature will become as high as necessary to overwhelm our efforts to exceed the capacity of our environment. As long as we succeed in driving forward along the historical growth path, counterpressures will become stronger and will appear in ever-proliferating aspects of existence. By our efforts, we are increasing the forces we fight.

CHARACTERISTICS OF SOCIAL SYSTEMS

Several generalizations from the dynamic examination of social systems will serve here as a background for discussing the church as part of the policy structure of society.

STRUCTURE AND POLICIES CAUSING THE PROBLEMS

One should address problems in a social system by first identifying the fundamental causes and then moving on to design revised policies for alleviating the problems. One should never attempt merely to find a solution without first establishing the dynamic causes. Such a results-directed beginning is likely to lead to the treatment of symptoms without benefit. For example, the nation has acted on its urban crisis during the last several decades without focusing on the causes of urban stagnation and decay. Instead, government has sequentially attempted to relieve symptoms as they arose. Congested traffic led to more highways, the central city became more crowded, parking garages were built, more people entered the city, buildings became taller, traffic continued to increase, and crowding and social dislocation worsened. All of these actions were taken without facing the questions of proper city size, desirable population density, and how to control both so that the other symptoms of overloading would not arise. Instead of first trying to relieve social system pressures, an analysis should begin by establishing a model of the structure and relationships that interact to produce the problems. That is, one should start by replicating the system that generates the symptoms. Only then can one be confident that he is beginning to understand the underlying causes.

Surprising as it seems, the difficulties in our social systems are caused by the interplay of elements that individually are well known and highly visible. Our social troubles do not come from hidden

causes or capricious behavior. Instead, they come from evident pol-
icies that are not recognized for either their true importance or the
dynamics of their interaction.

It was first in our studies of corporations that we realized how
well-known policies could interact to give puzzling consequences.
Time after time, we had the experience of going into a corporation
with conspicious and widely reported symptoms of trouble. The
symptoms might include low profitability, falling market share, or
high fluctuations in employment. Such symptoms are well known
both inside the corporation and out. In searching for the relevant
structure and policies, one discusses with people their actions and
their responses to pressures. In general, we found that people are
clear and articulate about what they are doing. Investigation usually
verifies that they are doing as they say. Furthermore, the actions in
general are motiviated by a sincere intention to solve the organ-
izational difficulties. Then, with due regard for the principles of
feedback structure, we have assembled into a computer-simulation
model those relationships, policies, decision processes, and inter-
actions that have been described by the participants. The computer-
simulation model usually shows that the known structure and
policies interact to create the observed troubles. In other words, the
very actions people know they are taking in an effort to solve major
difficulties are in fact producing those difficulties. A destructive
spiral can easily develop. A problem appears. The "solution" is
considered obvious and action is taken. By obscure dynamics within
the complex social system, the "solution" makes the problem worse.
However, because the deterioration is blamed on outside influences,
the "solution" is applied with ever more vigor, and the situation is
caused to deteriorate still further.

In urban decay, the same destructive spiral is found. The poor do
not have jobs and income enough to afford adequate housing. So
low-cost housing is built. The housing occupies land that should
have been allocated to job-creating activities, and, as a consequence,
jobs become more scarce. But the new housing attracts more of the
poor and unskilled. The unemployed population rises, jobs decline,
income per capita remains low, and destitution continues.

In our study of world interactions, it appears that hunger and
poverty trigger efforts toward industrial production and more
efficient agriculture. But more food, better sanitation, technology,
and public health measures allow population to rise. The circular
process of people increasing production and production increasing

population is responsible for the overwhelming rise in population that is creating a new set of global stresses.

Could it be that some of the actions being taken by our religious institutions in the belief that they will alleviate human suffering may actually be a part of the processes that produce that suffering?

GOAL CONFLICT

A social system, if it is to fulfill human needs, must meet a multiplicity of goals. These goals can conflict with one another in several dimensions — in current trade-offs, in time, and in hierarchy, Furthermore, the nature of the most important goal conflicts can change, depending on the mode in which the system is operating.

Conflict between Coexisting Goals. Goals can conflict in current trade-offs. That is, many goals exist simultaneously in different parts of a system. Efforts to reach one goal may mean that another is put further beyond reach. We simultaneously have goals for food, clean air, material goods, peace, sense of mission, elimination of current stresses, and confidence in the future. These objectives are coupled in various ways. Actions toward one goal may produce quite unexpected responses and deterioration in other system objectives. For example, efforts to improve the economic and technological aspects of cities attract population. Population densities rise until the economic and technological improvements are compensated by rising psychological tensions, crime, drug addiction, despair, and social disorganization. We know how to work toward economic and technical goals. But such effort shifts the system pressures into the more intangible sectors with which we cannot cope.

Conflict between Present and Future. A second goal conflict exists in time — between the present and the future. Actions to enhance the present generally deteriorate the future. Examples are all about us to illustrate how actions that favor the present can undermine the future. If one has an urgent report to finish, he can accomplish the most in the next twenty-four hours by working through the night, but the price is paid in lower effectiveness during the next two days. Or, if one wishes to improve his material living in the short run, he has only to borrow money, use his credit cards, and live beyond his means. But, in the long run, the price must be paid. If the debts are to be met, the standard of living must fall below one's average income. Likewise, the corporation can improve short-term profitability by postponing expenditures on new-product research and on the repair of equipment. But, in time, the quality of products

suffers, the efficiency of production declines, and profits drop lower than at the start. On a larger scale at a worldwide level, hunger can be reduced for a time by rapid increase in agricultural production. But, in the long run, more food permits more population. Food per capita falls back, and, in addition, the greater population density generates new stresses and complications.

Conflict between Subgoals and System Goals. A third goal conflict exists in hierarchy — between the goals of subsystems and the goals appropriate to the total system. For example, maximum wages to individual workers is in conflict with profitability of the business. Or, the minimum-cost goal of the business leads to excessive generation of pollution, with the price paid by the larger public in a poorer environment.

Attempting to enhance each subgoal of a social system does not assure the best possible outcome for the system as a whole. In fact, efforts to improve each of the components of a system can lead to far less than the best possible total results.

Churches, like other institutions, can fall into the trap of believing that pursuit of subgoals is the equivalent of maximizing quality of life in the total social system. Pursuing separate subgoals in education, medicine, agriculture, and disaster relief contributes to the population explosion, shifts people from agriculture to the cities, and sets the stage for greater social conflict.

Shifting Patterns of Goal Conflict. The most likely kind of goal conflict depends on the mode in which the social system is operating. Two behavior modes of the world social system are of immediate interest — growth and equilibrium. During growth, it is easy to enhance immediate objectives by actions that defer the unpleasant consequences to the future — goal conflict is in the time dimension. On the other hand, a system in equilibrium seems more apt to shift pressures quickly between coexisting goals — the goal conflict is between current trade-offs.

One can illustrate these shifting patterns of goal conflict by the changes that are likely to occur as growth gives way to equilibrium. For the last several hundred years, the world has been in sustained growth of population, geographical occupancy, and production of food and goods. During that time, production in many areas of the globe has been able to outrun the growing population and thereby produce a rising standard of living. Likewise, public health measures, modern medicine, antibiotics, and insecticides have been able to improve the health of many populations. But all of these measures are now seen as merely postponing the day of reckoning. The

very actions which gave the short-term improvements are the ones which are producing overpopulation, depletion of resources, crowding, and the reemerging threat of food shortage.

Now as the world system moves gradually toward an equilibrium state, it becomes less possible to push problems into the future. Now more often, the goal conflicts will be between coexisting goals in the present rather than between the present and the future. For example, imagine a population being held constant by two pressures. One pressure arises from a degree of malnutrition and the other pressure from a certain incidence of epidemics and poor health arising from crowding. Now suppose that the food supply is increased to remove the pressure from hunger. The population rises, the crowding becomes worse, and the pressure from disease increases. In other words, the pressure shifts relatively rapidly, within a few decades, to a new point in the system. The consequences of current actions can no longer be deferred, as was once possible, for centuries into the future.

COLLAPSE OF GOALS AND VALUES

Social systems tend to decay as a result of collapse in their long-term-goal structures. As the enduring values erode, emphasis shifts to short-term objectives. As the present is emphasized over the future, the result is long-term deterioration and further emphasis on the short run. As the goals decline, the decision processes change, and a downward spiral begins to sustain itself. For example, the collapse of values is often seen in a young corporation whose founders start a business dedicated to high product quality. Under the inevitable business pressures, quality may fall short of the goal. If the leaders are not firm in their convictions about quality, they become accustomed to and accept the lower quality. Because of the lower quality, prices must be reduced. Revenues are then so low that even the existing quality cannot be sustained. The new lower quality is accepted as inevitable, and the spiral of collapse continues from the initial high standards. All of our social systems are subject to the erosion of long-term goals, unless some effective institutional mechanism exists for sustaining a vision of the future and subordinating short-term conflicting goals.

Any operating goal of a social system can be thought of as depending on three components — long-term value, the traditional past accomplishment, and the weighting influence that determines the relative force of long-term value versus traditional accomplishment.

The long-term value component in an operating goal is an endur-

ing standard that transcends adversity and short-term pressures. It is deeply embedded in the collective character of the system. If the long-term values are to be sustained, there must be social processes for propagating and perpetuating them.

The second component of an operating goal is the perception of actual past performance. A social system that operates on past accomplishment as its only goal is merely striving to do as well as it did in the past.

The third component of an operating goal determines where the operating goal lies between the long-term goal and the past accomplishment. If the long-term values are persuasive and if there is an institutional structure to project them into day-by-day decision making, then the long-term values are influential. If the long-term values are weak, poorly perceived, irrelevant, inappropriate, or not sufficiently timeless in concept, then they fail to be influential, and the past performance becomes the only effective goal.

If one is only striving to equal his past accomplishment, adversity will probably cause him to fall somewhat short of that goal. As time progresses, the new lower performance becomes the historical tradition and performance continues to decline. It is the role of the enduring long-term components of the goal structure to prevent this downward spiral. In the corporation, the long-term enduring goals are usually set and perpetuated by a founder-manager type of strong leader. In nations, the goal structure is cast into the constitutions and the laws. But where is the even longer-term goal structure for a society to be found that can guide people in setting national goals?

There is no custodian of the long-term goals unless it be the religious institutions. On religion rests the responsibility for maintaining long-term values and preventing collapse of operating goals. But a religion and its teaching cannot make its long-term values influential if those values are contradictory, self-defeating, inapplicable, or inappropriate to a new dynamic mode into which the social system may have moved.

The Church in the Dynamics of Social Values

The "policies" of a social system describe the manner in which decisions are made. A policy states the process by which the existing circumstances are interpreted into a course of action. In the broadest sense, policies include folklore, emotional reactions, self-interest, humanitarianism, and all of the influences that govern action. Ethical structure is part of the governing policies of a society. To the extent

that religious teachings have influence and carry weight in social decision making, those religious beliefs must be included in a model that explains the dynamics of a society. Religious beliefs interact with other decision-making influences in a social system and are a part of the total policy structure that may produce either good or evil. Ethical principles interact with the principles of economics, technology, sociology, agriculture, and medicine to create today's pressures and social stresses.

From a system-dynamics viewpoint, religious teachings are a part of the policy structure of a society. The religious attitudes, traditions, and morality influence day-by-day decisions. Historically, religious values have probably developed in response to long-term social needs. To survive, a society must have a long-term value structure to counteract the short-term pressures. Without the long-term values, "living for the present," if carried to an extreme, makes the future impossible. The societies that have grown and prevailed are those with a viable concept of the future. Without such an enduring value set, the society fails to develop, decays from the inside, or is replaced by a more future-oriented social system.

As enduring values are gradually perceived by a society, those values are cast into religious codes. The religious codes serve to freeze and to propagate the long-term values. The enduring values take the form of religious documents, rituals, taboos, and doctrine. Added force and influence are often imparted by the belief that the values have been handed down from a deity above and outside the human system.

But the long-term value structure of a society can be too permanently frozen. The value structures of our great religions were developed at a time when social systems were beginning to evolve. The values were suitable to the conditions of the times and to the particular mode in which the social system was then functioning. But the values were products of the early times. Values were developed by trial and error. Societies with value structures that served poorly did not survive. The values that survived were suitable to the conditions under which they evolved. But, if the fundamental dynamic mode of a social system changes, there is little reason to believe that the earlier long-term values will have been so timeless that they will still apply equally well to the new mode.

Christianity developed in the context of one particular dynamic mode of our social system. It developed when man was sparsely settled on the earth, when geographical expansion was still possible, when man was puny compared to the forces of nature, and when

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science was yet to be exploited. The Christian values were effective for social survival and expansion. In fact, they are a value code that enhances growth. It is a code that gives man the obligation to develop missionary zeal. It gives man the right to mastery over nature. The values were interpreted as imposing a duty to extend God's chosen people and religion across the face of the earth. Christianity has made its believers responsible for the welfare of others, and that becomes an obligation to protect others from themselves, from the restrictions of more equilibrium-oriented religions, and from the vicissitudes of man's interaction with nature. In short, Christianity is a religion of exponential growth.

But exponential growth cannot continue forever. Tremendous internal pressures must be generated to suppress growth. During growth, the new shifts attention from the failures of the old. During growth, the onward-and-outward orientation diverts a society from introspection and self-doubt. But, as growth becomes less possible, long-term values directed at growth become less useful. Then the very institutions and psychological processes that perpetuated the old values become a liability. Those institutions, processes, folklore, and tradition were designed to keep the old values from being diluted and changed. But, if the values are not sufficiently fundamental to span both the old and the new dynamic modes of the system — here, in our discussion, if they are not sufficiently timeless to serve equally in growth and in equlibrium — then the institutions that once were the necessary protectors of effective values become, instead, the perpetuators of obsolete values.

Because the fundamental modes of social systems can and do change, the long-term values must either be so basic that they span all modes, or the long-term values must themselves be subject to gradual change. If they can be changed too rapidly, they fail to serve their purpose in protecting the system against short-term expediency. But if they are too inflexible, they are unresponsive to essential change.

The importance of having a correct blend of ease and difficulty in changing a set of social values is illustrated by the United States Constitution. Perhaps the great strength of that document lies in its mechanisms for amendment. The means for change seem to be neither too rapid nor too slow. Change is sufficiently difficult so that the Constitution cannot be altered in response to fleeting pressures lacking enduring value. On the other hand, the Constitution is not so inflexible and frozen that people despair of change and therefore react by abandoning its guiding values.

But is there a correct degree of responsiveness for modifying and

interpreting Christian principles? Is there a suitable way to redefine and extend religious principles in response to pressures that arise when the principles are no longer suitable? Is there any procedure for anticipating social changes so that modification can begin before the discrepancies between old values and new reality have become so great that society rejects the principles? Unlike the national Consitution, the Bible contains no explicit process for revision and updating. There is no way to introduce new insights that recognize newly emerging modes of behavior in our social systems. Without a means of revision, the escape from discrepancy between old doctrine and modern conditions has first been by reinterpreting the meaning of the old principles. By reinterpretation, society moves away from the literal words to figurative symbolism. Symbolism is more flexible and is subject to wider interpretation. But, in the face of discrepancy between the stated long-term values and the actual social necessities, the reinterpretation is apt to allow the long-term principles to drift into short-term expediencies. Secular forces supersede the long-term values, and the goal structure of the society is swayed by immediate pressures.

Much of the "credibility gap" being experienced by organized religion arises from the dynamic failures to fulfill the goal-setting need of society. Long-term values that served well during the centuries of growth are found wanting as the world is faced with the pressures of moving into equilibrium. Processes do not exist for revising those long-term values that should be more fundamental and enduring than even national constitutions. Without change, the discrepancies between the values and social relevance widens. To some extent the old values are rejected. But, partly, they are reinterpreted and are alleged to coincide with the short-term expediencies. Without an appropriate long-term value structure, the society begins to falter.

PREDICAMENT OF THE CHURCH

The changes in our social systems have shifted the ground on which religious principles have been established. The new system modes are dynamically quite different from those that prevailed when the principles evolved. The church, being without adequate processes for changing the value structure it propagates, is now in several predicaments.

SHORTENED TIME HORIZON

The church should be custodian of the longest-term values in a

society. Those values should look beyond civilian laws and national constitutions. As custodian of the future, the church should understand that long-term values will conflict with the short-term values and goals of man and society. The church must have effective ways to project long-term goals into the current processes of everyday decision making.

But what does the church today say about the ethical questions that arise in transition from growth to equilibrium? What does the church say about individual and national responsibility for the future? Is not the church a partner with secular society in maximizing present human welfare at the expense of future people? Is not the church an active force dedicated to social changes that can be realized only if growth were to be sustained beyond the likely limits?

The church will not be effective if it has lost its distant time horizon. If its values are the same as those of the secular society, the church need not exist. If church values are inappropriate to a newly emerging mode in the surrounding social system, the values will not be persuasive and cannot be projected.

But many of the old values of humanitarianism and the unique rights of man in preference to other living things have contributed to an exponential growth in human population and man's technology that brings man face to face with the ultimate global limit. What was once a long-term ethical structure that succeeded by deferring difficulties into the distant future has become a set of reactions that shifts stresses quickly from point to point. The value structure of the church is caught in the fundamental dynamic changes that occur when growth comes under pressure and the transition to the equilibrium mode begins.

OBSOLESCENCE OF THE GROWTH ETHIC

Now that growth in population and growth in the conquest of geography and nature can no longer serve as a unifying focus for the future, the church must seek a new set of values to hold before mankind. A new ethical structure with long-term values suitable for a future of world equilibrium is needed.

How is responsibility for the future to be imposed? How will the economic and psychological costs of the transition to equilibrium be assessed? What degree of coercion and restriction on individual freedom is necessary? What is the ethical foundation for penalties against the transgressors who overemphasize the present at the expense of the future?

COMPARTMENTALISM

Religion, like other aspects of living, has established itself in a compartment that is nearly cut off from other aspects of human existence. It shares this fault with most other human activity. Science, law, economics, and psychology are also in compartments as if each could exist in its own subworld. But our studies of systems show that important behavior modes and the serious troubles arise because of interaction among the subsystems. Human existence will not be understood or safely managed if each compartment is treated separately.

But who will assume responsibility for understanding the interactions? Corporations are compartmentalized into production, sales, research, and other functions; but the intuitive processes of management give no adequate capability for understanding the interactions of those functions. Medicine studies organs and diseases but has no specialty that deals with the dynamics of medical systems. Nations have departments of state, agriculture, defense, commerce, and health but have little capability for understanding the interactions of the many national efforts. A governmental research program would not address itself to social values of the time horizon that should interest the church because such would clearly lie outside the responsibility, wisdom, or political feasibility of any government agency.

The institution with the longest time horizon is in the best tactical position to lead in exploring the nature of the social system; the church should establish that distant horizon. Long-term values are closely tied to what society is to be one hundred, or two hundred, or one thousand years hence. If not the church, who is to look that far ahead? But the church is in the predicament of undergoing a shortening time horizon when it should be leaving the near-term to other institutions and should be turning its attention to a horizon beyond that of any other unit in the society.

EGOCENTRICITY

Through his religious concepts, man has established for himself, in his own mind, a unique position at the center of the universe. At one time, this meant literally the physical center, with the sun and stars revolving around the earth. Far more recently, it has meant man as a uniquely chosen creature in nature, with special rights and privileges over the natural surroundings. But that egocentric view of man at the center, with nature at his disposal, is becoming as untenable as

the geocentric theory of the world at the center of the universe. When man made graven images to worship, those images were usually in the form of man. As religion became more spiritual, physical images were discarded, but the mental images of God remained in the pattern of man both in form and in emotion.

Man's view of his world and his place in it has gradually broadened. The change is illustrated by the expanding concept of selfishness. When man was being admonished to be literally his brother's keeper, selfishness was an act against one's family; but generosity was not expected to extend to other family tribes who were one's enemies. Later, the boundary expanded within which generosity was expected. First, the city became each person's responsibility; then nations became the boundary of one's obligations. Much more recently has grown the contention that all of humanity falls within the boundary; but it has remained permissible to be selfish toward anything outside of mankind, that is, toward the natural surroundings. This latest view drives churches to help men everywhere, but with what consequence? By helping the human population to grow, and by protecting man from the retaliation of nature, mankind is showing the height of social selfishness toward the environment. One must ask, When is generosity a virtue and when is it a sin against the world? When is generosity a duty and when is it only a means of self-satisfaction? Is selfishness any less sinful when exercised in favor of mankind as a whole than when for oneself? Such questions must be explored anew now that the alleviation of one world pressure can actively increase some other pressure in the present or near future. What are the proper trade-offs? Our ethical and religious beliefs are in disarray because they contain contradictions and conflicting goals.

FALLACY OF HUMAN EQUALITY

The collapse of the religious time horizon has had a curious effect on our attitudes toward human equality and responsibility. If the focus of attention is on only the immediate present, then responsibility for one's actions is irrelevant, because responsibility implies consequences in the future and there is no attention on that future. All people can then be considered equal at any moment in time and should be treated alike because they bear no responsibility for their past or toward their future. But consider what this viewpoint does for the goals of a civilization confined in a fixed environment.

Imagine two countries side by side, each with a population and an industrial capability that can sustain them indefinitely at a high

standard of living. Assume that country L has a long time horizon, realizes that it cannot allow population and industry to grow without exceeding the natural capacity and thereby lowering the standard of living, and accepts the relf-restraints and the short-term penalties necessary to come into equilibrium with nature at a high quality of life. On the other hand, assume that country S has a short time horizon, lives for the present only, does not plan for the future, avoids traumatic self-discipline, allows population and industry to grow, exhausts the capability of the environment, and after fifty years falls to a miserable human condition. After the fifty years, what is to be the responsibility of country L toward country S? If country L must in the future share with country S, then country L suffers in both the short run and the long run. Country L accepted the strain of establishing a national equilibrium at an early date and then is to be denied the fruits of that action by also suffering the misery that must come from sharing equally with country S when S has overcommitted its resources. If the ethical principles teach that country L and country S are to share equally in the future, there are no incentives for anyone to manage for the future.

If all men are not to be equal at every point in time, then there is some boundary to be established around the concept that one is to be his brother's keeper. Furthermore, with the very long time delays that are inherent in our social systems, responsibility to the future must extend well beyond a person's own lifetime. In country S, the penalties of living for the present will not mature until two more human generations have moved onto the scene.

If one has a responsibility for the future, an inescapable symmetry commits him to a legacy from the past. There is no basis for world equilibrium unless the sins of the fathers are to be visited on the sons. One can have no right to equality in the present but only to an accumulated equality that reflects the actions of his heritage and the long-term goals of his ancestors. The ethical and religious issues need to be reexamined and made consistent with the dynamic realities of our social systems.

POTENTIAL EVIL IN HUMANITARIANISM

Humanitarian concern means help for one's less fortunate fellow-man. At times, such action is based on a much too simplistic view of the situation. Such help is usually aimed at immediate goals. Long-term and short-term goals may be in conflict. When does help in the present lead to increased distress in the future? What concepts of right should govern?

Consider a country that is overpopulated. Its standard of living is low, food is insufficient, health is poor, and misery abounds. Such a country is especially vulnerable to any natural adversity. There are no reserves of food. Medical facilities are always overloaded. There is no reserve to cope with any kind of misfortune. Floods make many homeless; but is that because of the flood or because over-population forced people to live in the flood region? Droughts bring starvation; but is that due to weather or to the overpopulation that made food reserves impossible? The country is operating in the overextended mode where all adversities are resolved by a rise in the death rate. The process is part of a natural mechanism for limiting further growth in population. But suppose that humanitarian impulses lead to massive relief efforts from the outside for each natural disaster. What is the long-term result? The people who are saved raise the population still higher. With more population, vulnerability of the country is increased. Epidemics become more likely; and internal social strife, more probable. A smaller adverse event can now trigger a crisis. Disasters occur oftener, and relief is required more frequently. But relief leads to a net increase in the population, to more people in crisis, to still-greater need for relief, and, eventually, to a situation that even relief cannot handle.

A point is reached where humanitarian action generates the demand for still more humanitarian intervention until the entire socioeconomic system falters. The church should begin to examine the limits and consequences of humanitarianism. The church should bring humanitarian concepts into a consistent relationship with the pressures accompanying the transition to global equilibrium.

RIGHT IS NOT ABSOLUTE

Our concepts of "right" are system policies. The concept of right is a guide to action. But do we mean the action that is right for the immediate future or for the distant future?

In the teaching of the church is often the implication that right is absolute, that it knows no compromise, that it is independent of the future time toward which one looks. These are fallacies. Generally, a system policy that is desirable in the short run is detrimental in the long run, and vice versa. The action that is right in the short run may be wrong in its long-run effects. The church has taken an overly simplistic view of right and ethics. As a consequence, it contributes to the goal conflicts between present and future.

The church should take the leadership in reexamining right and wrong in the context of the time horizon. The time conflict should

be recognized. The church, if it is to be the custodian of long-term values, must define right in terms of the enduring and future welfare of mankind. Other institutions will adequately defend the short run.

ACTION

This paper has described part of the predicament of the church as seen from a system-dynamics viewpoint. I have not attempted to answer the questions that have been raised. Generating answers is a major task for the future.

The issues raised here are amenable to treatment by a properly planned research program. The process calls for integrating the long-term dynamics of the ethical value structure into the socioeconomic-technical models that are coming into existence. Some of the best minds from theology, law, philosophy, economics, and science should convene along with professionals in system dynamics. The various social subsystems should be interrelated, including the dynamics of goal and value creation. By using dynamic system models to organize thought and to determine the consequences of assumptions, there should emerge a sharper image of the future role of the church in society's impending transition from growth to world equilibrium.

NOTES

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