

# THE ECONOMY OF HUMAN ENERGY

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New York

THE MACMILLAN COMPANY

1924

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## PREFACE

Several years ago a volume appeared entitled "The Foundations of National Prosperity," bearing the subtitle, Studies in the Conservation of Permanent National Resources. It was written conjointly by four authors, Professors Ely, Hess, Leith and Carver. The last and least meritorious part, entitled The Conservation of Human Resources, was the present writer's contribution. It defended the thesis that the principal resource of any country was its fund of human energy, that this resource was easily wasted or dissipated, and that its conservation was the greatest of all economic problems.

Professor Ely, the promoter of the earlier volume, has urged the writer to expand his former contribution into a separate volume. This is now done, and the result is before the reader.

It contains practically everything that was in the author's part of the former volume, and some more besides. The reader will find much that is commonplace, but it is hoped that he will also find some new material and, especially, some new points of view. The author has long been convinced that moral practices have much to do with economic prosperity, and that it is therefore as inexcusable to ignore them as it would be to ignore geographical resources, currency systems or anything else that affects national prosperity. This is his apology for discussing such topics.

The author desires to thank Professor Ely and the Macmillan Company for the interest and consideration they have shown. He wishes also to express his sincere gratitude to Miss Helen Prescott for her interested and faithful work which made the preparation of the manuscript possible.

Cambridge, Mass.

May 1, 1924.

## INTRODUCTION

Much that is said and written on the subject of waste is confined to the waste of money, food, fuel and other material resources. These things are important in themselves and deserve attention. The only serious form of waste, however, is the waste of man power or human energy.

Habits which look wasteful may prove to be highly economical when studied with a view to the waste or economy of human energy. Americans, for example, are said to be wasteful. They are in a sense, but in another and more important sense, they are the most penurious people in the world. We are wasteful of money in a way; but strictly speaking, money can not be wasted except when it is worn out or lost. If one loses it, some one else gets it. When it is misspent for a useless thing, the thing that is really wasted is the man power that is hired to produce the useless thing. When it is wisely spent, or economically spent, the thing that is really economized is the man power that is hired to produce the useful or beneficial thing.

We are also wasteful of food. It is commonly asserted that an American family will throw away enough to feed a European family. That may be true; and doubtless the great American garbage can will bear looking into. To save all that food, however, would require time and painstaking care, and Americans are

penurious of time. To spend valuable time saving a few cents worth of food is not necessarily economical. People who do not value their time, either because it is not worth much or because they do not know how much it is worth, can spend time lavishly to save a few pennies or a few scraps of food. They may be said to be spendthrifts with respect to time and misers with respect to other things. Americans are likely to be penurious of time but spendthrifts in everything else. Doubtless a sound balance between the two forms of penuriousness would be better than either extreme, but that is no reason for rushing from one extreme to another.

Americans are also exceedingly economical of labor. No other people make such extensive use of labor-saving devices. More than half of all the telephones in the world are in the United States. More than two-thirds of them are in the United States and Canada. The telephone saves time and effort, but it costs money. It costs money in more ways than one. Our whole system of retail marketing has had to adjust itself to the fact that householders are determined to save themselves time and trouble. In order to save the householder's time and trouble the food merchants have to incur expenses that are not necessary in countries where householders go to market and carry their purchases home in baskets.

Even our amusements are taken in a hurry, so determined are we to save time in everything. One of the first things a child wants to do is to "go." Grownups seldom outgrow it. The automobile is only a glorified go-cart, and every one who can afford one, and is not too old to learn to drive, has one.

The waste of food is, ultimately, a waste of the man

power that produces it. To waste more man power trying to save some food than would be required to produce an equal amount would be poor economy. It would be a little like urging a carpenter to climb down from his scaffolding to salvage a nail that had been dropped, or a lumberman to waste a lot of time saving small branches of trees for fire wood. These things are done in countries that have man power to spare, but not in a country that tries to economize its man power.

In order that our people may be encouraged to think of every economic question as a question in the economy of human energy or man power, this book is written.

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Economics, sociology, and ethics are all concerned with the economizing of human energy. Behavior should be evaluated in terms of its survival value, not in terms of its origin.

# THE ECONOMY OF HUMAN ENERGY

## CHAPTER I

### THE EQUILIBRIUM OF HUMAN ENERGY

#### **The theme of economics.**

National prosperity is the theme of economics. What makes a nation prosperous is the question upon which every economic discussion that is not a waste of breath must throw some light. Why do some nations prosper and others not, under equal or similar geographical conditions? Because some economize and others waste their energies or their working power. Why do some nations advance and others retrograde in civilization? There is no mystery nor magic about it. It is a question of what the people do with their energy or working power.

#### **How prosperous does a nation deserve to be?**

Given a reasonably favorable geographical situation, any nation can be just as prosperous as it deserves to be. Its prosperity is limited only by its own wisdom and virtue as shown in the economizing of its energies. It can not, by any possibility, prosper by wasting its energy or its man power; it can not help prospering if it economizes it. The problem of economizing the energies of millions of people is, however, a problem of the greatest complexity, involving factors whose results can be pre-

dicted or measured only with the greatest difficulty. But the fact that a problem is difficult is no reason for not solving it, especially when it is a problem of such vast importance as this.

### **Living a problem of energy.**

The problem of living, even in the animal sense, is largely a problem of economizing energy. The energy used up in merely keeping alive must, of course, be replaced from some source, or the animal can not remain alive. In addition to the overhead expense, or the fixed charge of merely living, all the higher animals have running expenses as well. The most important item in the list of running expenses is the energy used up in scurrying after food. When all these fixed charges and necessary running expenses of the organism are more than replaced by the energy income from the food obtained, life becomes profitable. When there is a surplus of energy, or an energetic profit, the surplus may then be used in ways that make life worth more than it costs. Whether there is a surplus of energy or a deficit, depends upon how effectively energy is expended in the quest for food. If it is used uneconomically there is likely to be a deficit of energy, tending toward bankruptcy and extinction. If it is economically expended, there is likely to be a surplus of energy which makes possible an expansion of life in several directions.

### **Dissipating surplus energy.**

There are several ways by which an animal may dispose of a surplus of energy when such a surplus exists. It may, on one hand, dissipate the surplus in sloth, in play or in the multiplication of numbers; it may, on the other hand, store up energy, either in the form of fat

or in the form of a hoard of unconsumed food material. If it remains idle, the mere overhead expense (in terms of energy) of living will soon use up any surplus and make it necessary sooner or later to resume the quest for food. If it plays, the increased expenditure of energy through its muscles will hasten still more the necessary renewal of energy by means of new food. If it multiplies, the increasing numbers will make it harder and harder to find food and will therefore prevent any permanent surplus from ever accumulating. The storing of a hoard of fat or of raw foods has its limits and at best only permits an animal to live through a period of deficit caused by drouth or cold. The normal life processes tend to prevent anything resembling a permanent surplus and to preserve an equilibrium of energy.

### **The Equilibrium of animal energy.**

By an equilibrium of energy, in this sense, is meant a condition in which the animals of a given species, living in a given habitat, are barely able to secure enough food to replace the energy that is used up in the process of maintaining the number of the species. All the food that the average individual can get is just enough to replace the energy that is used up, first, in merely living; second, in escaping from or fighting against enemies; third, in the process of finding or gathering food; and fourth, in reproduction to replace the old and wornout individuals, or to enable the birth rate to balance the death rate. This leaves neither a surplus nor a deficit of energy, there being just enough to enable the species to live and get a living without increase or diminution of numbers. There is no chance for rest beyond what is necessary for recuperation; there is no chance for

play except on the part of the young, whose play is a means of developing the powers that will later be necessary to the work of living; there is no opportunity to store up fat or hoards beyond what is necessary to tide them over regularly recurring spells of cold or drouth. And they are not able to reproduce faster than is necessary to balance the death rate, any increase in the birth rate, under these conditions, forcing an increased death rate because of lack of subsistence.

### **Tendency toward an equilibrium.**

If, for any reason, this equilibrium is disturbed, it tends to re-establish itself. Let us suppose, for example, that for any reason, food should become so abundant, or so easily procured, as to create what, in a former paragraph, was called a surplus of energy. That surplus would certainly be dissipated in one of the ways indicated above. First, the animals would not exert themselves to procure more food than was necessary to keep alive. In other words they would rest while the life process used up the surplus of energy. Second, they would play, and the increased muscular activity would use up the surplus. Third, they would store up surplus energy in the form of fat or a hoard. Unless this stored up surplus is used to enable the animals to rest, play or reproduce at a later time, it is of no use to them. If they expend energy in accumulating a hoard which they never use, the energy used in the process is lost as certainly as though it had been expended in play or rest. Fourth, the animals would reproduce more rapidly, the birth rate would, for a time at least, exceed the death rate, and numbers would increase. This increase of numbers

would, in turn, make food harder and harder to get, until the equilibrium was re-established.

### **Reproduction as an outlet for surplus energy.**

So powerful is the procreative tendency in all of the lower orders of life that the fourth of the above possibilities is certain to become a reality. Well-nourished plants produce seeds in such numbers as to insure that the ground will quickly become seeded and that it will bear as many plants as the soil can nourish. Grass will grow as thick as the soil will support. The power of reproduction is never, except for short periods, the limiting factor in the determination of numbers; but numbers can never be greater than the limited subsistence will permit; in other words, the power to get food is always, in the long run, a limiting factor and will become the limiting factor where enemies and other destructive agencies do not keep numbers down. The same is true of all animals so far as they are known. Given ample nourishment and freedom from destructive enemies, they can all reproduce at a rate that will exceed any natural death rate. That is to say, a single generation can produce offspring and bring them to maturity in numbers greater than necessary to replace itself. A single pair can, during a normal life, produce and bring to maturity more than two offspring. There never can be more than two deaths among the two parents. There can be many more births from them. Unless enemies or hunger prevent the young from maturing and reproducing, each generation will be larger than the preceding. The inevitable result of this is so to increase numbers as to overstock the pasture, overpopulate the region, or make it so hard to get food as to either increase the death

rate or decrease the birth rate until there is a balance between the two.

If, however, the equilibrium is disturbed in the opposite way, the same tendency toward a restoration of the equilibrium shows itself. Let us suppose, for example, that a given cattle range becomes overstocked, so that the cattle can not get food enough to replace the energy used up in living and searching for food and water. The herd will be thinned out in some way. The death rate may increase, the birth rate decrease, or they may migrate if there is any understocked range to which they can go. When they are sufficiently thinned out, the remainder can live and maintain the equilibrium. Thus we see that, no matter how the equilibrium is disturbed, it tends to reassert itself. This is one phase of what biologists call "the balance of nature."

### The energy cycle.

Men have not been able to escape from the energy cycle. Says Birck:<sup>1</sup>

"As a means man is a *working machine* which creates and supplies *energy*; our consumption refunds us the energy expended by our activity; part of the energy supplied through our consumption is expended merely in keeping alive—in "preserving the machine." We know from feeding-experiments that the functions of life consume a great part of the calories of the food, and that only part is transformed into muscle; only part of the energy supplied is converted into productive work. Progress, whether individual or universal, is founded upon the existence of a surplus of energy; part of the energy at our command we invest in the productions of our labour. The *workman* is possessed of *working-power* which produces "doses" of *energy*. These doses of energy may be useful in themselves (personal services) or be incorporated in things (substances);

<sup>1</sup> See L. V. Birck, *The Theory of Marginal Value*, p. 2. London, 1922.

substances as well as services are thus economic goods. We now have the circle: Human energy—production—economic goods—consumption—satisfaction—energy. Compare: want—effort—satisfaction.

### **More effective ways of storing energy.**

Apparently the only ways in which human beings have improved on what plants and animals have done with their surpluses are, first, to invent more ways of playing; second, to invent new and more effective ways of storing; and third, to gain some control over the rate of multiplication. By inventing more ways of playing, we have probably managed to get more fun out of life. By storing in more effective ways we have been able to plan our work with a longer look ahead and have not been limited by the daily necessity for food to live from hand to mouth. By exercising some control over the rate of multiplication some branches of the human race have avoided such prompt overcrowding as takes place among plants and animals, and have, at certain times and places, maintained for centuries a surplus of energy. Except during these sporadic periods of civilization, the greater part of the human race has never been much further from the state of equilibrium described above than have the lower animals. Even civilized men have seldom realized on how narrow a margin of surplus energy they were operating.

### **Migration as a relief for overpopulation.**

Migration as a means of relieving the pressure of population upon subsistence is usually at the expense of some other race or species. It may relieve the pressure of population in the case of the emigrating group, but it must obviously increase the pressure on the part of the



group already occupying a new territory. In the case of human populations, this usually involves a war of conquest, and in some extreme cases, a war of extermination.

It is strange how the expansion of territory has been minimized in discussions of problems of food and population since Malthus wrote his famous essay. It has been pointed out with almost depressing frequency that people of European extraction have multiplied greatly since Malthus's day without any decrease in the standard of living or any approach to starvation. The depressing part of it is that this is commonly regarded as a refutation of Malthus. Such writers overlook the fact that the area from which these European peoples have drawn their food has expanded even more than the population. In order to make it a valid refutation of Malthus, it must be shown that the present numbers of European races could live as well from European soil as they now live from the wide areas from which they draw their subsistence. It would be necessary to show that people of English descent could all live as well from the soil of England as they now live from the soil of England plus that of the United States, Canada, Australia, South Africa and all the other areas from which they draw their subsistence. It is so obvious that the problem of feeding increasing populations from increasing areas is different from the problem of feeding increasing populations from the same area, that it is hard to account for the fact that men with apparent intelligence have failed to see the distinction.

**Migration does not ordinarily increase variety of food.**

It has even been suggested that the reason for spreading over more territory is not in order to increase the total means of subsistence, but rather to increase the