

3

MC 6439

BOX 126 FOLDER 3

[Club of Rome conference]

1970

OK

AIR MAIL

JWF 7/20/70

BANQUE DE BRUXELLES

SOCIÉTÉ ANONYME

LE PRÉSIDENT

Rue de la Régence 2,  
1000 Bruxelles.

13th July, 1970.

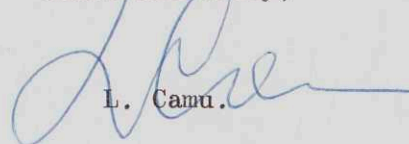
Dear Professor Forrester,

Thank you very much for your memorandum of 3rd July about the Seminar in Cambridge, Massachusetts, from 20th to 31st July on the Dynamics of Social Systems. I would have been most interested in this meeting which you so kindly suggest that I should attend, but it is unfortunately quite impossible for me to go to America at that time. I shall be on holiday, which is also necessary from the point of view of the "Management System"!

I was very happy to make your acquaintance in Berne and hope very much that we may meet again in the not too distant future.

With kindest regards,

Yours sincerely,

  
L. Camu.

Professor Jay W. Forrester,  
Alfred P. Sloan School of Management,  
Massachusetts Institute of Technology,  
Building E 52-454,  
Cambridge, Massachusetts - 02139.

9:00 Tues. July 21 '70 C.O.R. Conference.

Nature of models:

A representation of reality  
always a simplification

Based on a choice of alternative selections from  
real system.

Everyone uses models.

Mental models.

One does not have a city, or a company,  
or a society in his head.

Each person a different model.

Any one person -- his model changes  
as the thread of the discussion  
changes.

Mgt. conf. - sales department.

Always deliver on time, no loss of  
orders due to long delivery.

Principal reason for losing sales  
is unavailable product.

Raising price 10% would lose our market  
Price doesn't matter, quality is  
what our customers want.



9:00 Tues July 21 '70 (cont)

mental models deal with only 3 or 4 variables at a time.

an individual 2 or 3 crises -

a country, Viet Nam, inflation are all that can be in forefront, space, & cities, ~~losing~~ integration falling into the background.

Mental models often wrong on dynamics.

\* Example in companies, troubles well known, ~~inter~~ people clear on what doing, cause of trouble.

Computer model.

Use mental models as point of departure.

Effective approach if our observation is correct.

- a. People good observers of immed. environment
- b. People not good at dynamic consequences of known parts.



## Structure :

What feedback loops?  
 What choice of components in a loop?  
 Skill and judgement of the <sup>social</sup> dynamicist.  
 Always a frontier where skill & judg. apply.  
 True in science.

To here  
 Tues July 21 →

no 15 rules to guarantee a Nobel Prize  
 Ingr. says can't capture his judgement in a model  
 show him ~~can't how~~ can do.  
 He asks how to select model. -- Skill & judgement

## Structure as a Theory :

∗ Quotation from Bruner.

Great books in a field. Verbal theories.

Economics Adam Smith

M~~ax~~

J.S. Mill

Marshall

Keynes.

None in 35 years since Keynes General  
 Theory of Employment, Interest, & Money.  
 These men drew on their own observations.  
 Not fearful making an assertion  
 with enough clarity that attack  
~~was~~ by others was possible.

History of development of system structure

2 years on prod. dist. system

2 years on Sprague.

2-3 " on corporate growth,

2 months on urban dynamics.

1 day on WORLD.

Build a library of techniques, subsystems,  
basic concepts.

Only now learning how to teach these.



*Preliminary Jot home*

July 7, 1970

MISCELLANEOUS NOTES ON THE WORLD DYNAMICS MODEL

We will pick initial values corresponding approximately to the year 1900. For equation one on population I am taking a population of 1.65 billion people in 1900 from the article by Peccei in the magazine "Successo" of June 1970.

In picking values for normal birth and death rates we will use figures that represent a 2% per year annual population growth rate. This figure comes from Peccei's book Chasm Ahead published by MacMillan on page 164. If we pick as reasonable but without searching for justification data a life expectancy of 40 years for the world as a whole, we get a value of DRN of .025. The birth-rate (BRN) should then be 2% higher or (point) .045.

All the references to normal conditions will be estimated as nearly as possible to correspond to the year 1970.

Equation 2 is written on the basis of a birth rate which is given normally as the population multiplied by the birthrate normal and then this number is modified by 4 multipliers representing food, material standard of living, crowding and pollution.

Equation 3 describes the effect of the material standard of living on the birth rate. Here the model represents the material standard of living of the world as a whole. However, we recognize in the selection of all tables and coefficients that the standard of living is not uniformly distributed. We have before us a wide dispersion over the face of the world in all of the concepts represented in this model. We can use what has happened in the industrialized nations as an indication of what could eventually happen if all of the world's population should change to conditions represented by those nations which have experienced the greatest technological change. In equation 2 the material standard of living includes, because it is less appropriately assumed in the other multipliers, all such considerations as shelter, medical service, use of energy and material goods.

The table BRMMT in equation 3.1 is shaped here to show a rising birth rate as the material standard of living increases but with the birthrate declining again at the higher levels of material standard of living. This seems to be what has happened in the countries with a more advanced technology. I will try to adjust initial conditions to make this multiplier approximately unity at the beginning point in 1900. In other words, the material standard of living for



for the world as a whole at that time would be about 10% of that in the Western technologically advanced countries at the present time. A value of  $MSI=1$  is assumed to represent a typical value for western Europe and North America in 1970.

In equation 4 the material standard of living is taken to depend on the capital investment per person which is not required in agriculture. The units are in terms of the western industrialized countries in 1970. The coefficient  $MSLN$  represents this scale of reference. It is increased or decreased by the multiplier  $ECIR$  which represents the effective capital investment per person.

Equation 5 gives  $ECIR$ , Effective Capital Investments Ratio which is available for non-food growing purposes. It starts with the total Capital Investment Ratio ( $CIR$ ) and multiplies by the fraction left after allocating Capital Investment to agriculture. The result is then multiplied by the Natural Resource Extraction multiplier which is used to represent the effect of depletion of natural resources. As resources are depleted, more and more capital investment is required for any given output.

The natural resource extraction multiplier represents the difficulty of using natural resources as they become depleted. For the purposes of this model, natural resources can be considered those which are stored in the earth and can be depleted and we might let the food multiplier stand not only for food but for all other natural resources which are grown and regenerated by natural continuing processes. In other words, wood might be considered part of the natural resources which are included with the concept of food and, on the other hand, metals and stored fossil fuels would be in the natural resources in  $R$ . The natural resources are subject to depletion and their extraction rises in cost as they are used. The natural resource extraction,  $NREM$ , drops to 0 when natural resources drop to zero. We will assume that natural resources remaining in 1900 are near or above the .9 ratio. In other words, depletion has only started at the beginning of the simulation run.

Equation 7 is the Natural Resource fraction remaining in terms of the actual natural resources and the initial value.

Equation 8 is the level equation for natural resources starting with an initial value and depleting this according to the usage rate. The unit of natural resources will be taken as the amount used per capita per year by the world population in 1970. The world population for 1970 from Peccei is 3.6 billion and we will assume that the natural resource usage rate is such that this usage would deplete natural resources in another two hundred years. From this an initial value of natural resources can be computed as 3.6 billion people times 1 Natural Resource Unit per person per year times two hundred years



divided by .8 as the fraction of natural resources now remaining. The result is 900 billion units.

The natural resource usage rate is proportional to population multiplied by a normal rate and multiplied again by the material standard of living. The natural resource usage normal (NRUN) is taken as unity representing the world wide average consumption usage rate in 1970 for which the Material Standard of Living (MSL) would have a value of 1.

(Check the discussion of equation 4 for MSL. Possibly it was defined for the western technical countries rather than for the average world conditions.)

Equation 10 for death rate has the same structure as birth rate. Normal death rate is taken as  $1/40$  per year and this value is modulated by multipliers representing the material standard of living, pollution, food, and crowding.

The death rate material multiplier (DRMM) is centered around the 1-1 point representing present average world conditions. This is for a normal life expectancy of about 40 years with a 0 material standard of living we here assume that the death rate will double. On the other hand no increase in the material standard of living can do more than cut the death rate in half.

Equation 12 for the death-rate pollution-multiplier DRPM is constructed around a situation where present 1970 world pollution is taken as a unity density and where we assume that this is just beginning to have a significant affect on death rate. Higher densities of pollution will relatively rapidly increase death rate while lower values have very little affect.

Equation 13 gives the effect of food availability on death rate. Here a food ratio of 1 is taken as the 1970 world condition. As the food per capita decreases the death rate increases rapidly. On the other hand as the food per capita increases the death rate will fall only slowly and here is taken as .7 of the normal world value. In other words, the assumption is that at the present time the world is on the verge of a rapidly rising death rate should the food level fall much from the present average. On the other hand increased food by itself probably can not do more than increase life expectancy by about 50%.

In Equation 14 the death rate due to crowding can be taken as representing the affects of disease, psychological trauma, war, and any affects traceable to crowding in its own right and not related to food or pollution. We take here very little affect from the crowding multiplier up to the present population density of the earth. Up to the present density there has been a strong tendency to spread over the face of the earth with rising population so that average den-



sities have not reached a critical point. However, if we should imagine the present world population rising by another factor of 5 we might expect the social strife to substantially raise the death rate. We here take a death rate multiplier of 3 to accompany a population 5 times that now existing.

Equation 15 calculates the crowding ratio. A ratio of 1 is the present crowding of population on the world land area. Using a world land area of 135 million square kilometers (taken from the world almanac) and the present 3.6 billion people from the Successo article by Peccei we find that the present average population density on the earth is 265 people per square kilometer. Equation 15 combines these to give a crowding ratio in terms of present world conditions.

Equation 16 is the birth rate crowding multiplier and shows a fall in the birth rate as world crowding increases. However, not a very strong dependency is being assumed here with the birth rate falling to .65 of its normal value when the world population rises to 5 times its present value.

Equation 17 describes the birth rate food multiplier. At 0 food per capita the affect would naturally be to suppress birth rate and extinguish the population. Because the model is built around 1970 as the reference point for definitions, a food ratio of 1 represents present world conditions and produces a birth rate multiplier of 1. It is suggested that an apparent unlimited food supply, for example a double the present world level, would tend to increase the birth rate substantially and this increase is here taken as a factor of 3.

The birth rate pollution multiplier represents the affect of pollution directly on birth rate. The table suggests that the affect has been very slight up to the present levels of pollution but will become progressively greater as world pollution rises to 6 times its present level. Unity pollution level is here defined as the 1970 world level.

The food ratio in equation 19 is stated in terms of 1970 conditions. It increases if the agricultural capital investment per person increases, it decreases as the crowding on the earth increases and it decreases as pollution increases.

The food crowding multiplier represents the affect of earth occupancy on the ability to grow food. A crowding ratio of 1 represents 1970 conditions. The table suggests that we are in a steep portion of the curve. The best agricultural areas have already been occupied. A smaller population would allow much more efficient agricultural output. As crowding continues, not only will land be occupied by people and taken away from agriculture but also the best quality of land is apt to be occupied by urbanization leaving only less suitable land for agriculture. Possibly the curve should drop even more steeply than shown here.



Equation 21 gives the food multiplier as it depends on capital investment in agriculture. The table suggests that the affect of capital investment per capita decreases with rising capital investment. The 1970 conditions are taken as a unity on each axis. The initial value of .5 implies that even with a 0 capital investment food production is still possible in the form of harvesting natural products. However, a reasonable average standard of living would be possible only if the population falls to allow the increasing productivity of better food producing land to compensate for the falling capital ratio.

Equation 22 establishes the capital investment available in agriculture in terms of the total capital investment and the fraction used for agriculture.

Equation 23 gives the capital investment ratio in terms of 1970 world values. In other words, if CIR is a unity the capital investment per person is equal to the average world wide value at the present time. Capital investment is therefore measured in units representing the present per person amount.

Equation 24 accumulates the total world wide capital investment. The initial value taken for the year 1900 is set at  $\frac{1}{4}$  as much as the initial population at that time. In other words, the capital per person in 1900 is being assumed  $\frac{1}{4}$  as great as it is in the world today. This number could be checked for plausability. No information is at hand at the moment.

Equation 25 for capital investment generation CIG is stated in terms of the total population and the average capital investment creation per person.

Equation 26 gives the capital investment per person per year in terms of the material standard of living. The theory here is that part of the material standard of living can be diverted to capital accumulation. If food requires the utilization of all capital equipment and there is none left to raise the physical standard of living there is little likelihood of capital accumulation. To estimate appropriate values we again refer to the 1970 condition of the world. The existing capital investment has been stated in terms of 1 unit per person. If we assume that investment deteriorates over a period of 40 years and if we assume that capital investment today is being accumulated at twice the rate of deterioration, we would have a value of CIDN in equation 27 of .025 and the value of CIPC would need to be .05. This would suggest that capital investment per capita is doubling each 40 years. These figures and assumptions should be checked when possible. The table for equation 26 suggests that as the material standard of living increases the rate of capital formation can increase even more rapidly. As human physical needs are met a larger and larger fraction<sup>of production</sup> can go into capital formation.

Equation 27 represents the deterioration of capital investment on the



assumption of a 40 year life.

Equation 28 shows the affect of pollution on food production. It suggests that very little pollution affect has yet been felt at a pollution ratio of unity which corresponds to 1970 conditions. On the other hand, if pollution increases several fold food production is progressively and seriously affected. The figure asserts that if world wide pollution were to rise to 6 times the present value, food production could be cut by a factor of 10. This may be too extreme but depends on the extent to which cumulative affects may occur within the environment as a result of growing pollution.

The pollution ratio POLR in Equation 29 gives the ratio of the total pollution in the world to a pollution standard POLS. The pollution standard POLS is in terms of per capita units in 1970. In other words, 1 unit of POLS is the total pollution in the world environment for each person in the world. The value of POLS is taken as the 1970 world population.

Equation 30 is the level equation for total existing pollution. Its initial value for the year 1900 is taken as .2 billion. Population at that time was taken as 1.65 billion. The initial pollution is therefore 1/8 as much per capita as in 1970.

The pollution POLR in Equation 31 is given as the population times the pollution rate per capita normal times a multiplier derived from the capital investment ratio. To arrive at a value of POLN we must consider how large the pollution reservoir is in terms of pollution duration time. It appears that such pollutants as smoke may be dissipated by the environment in a matter of days. On the other hand, many pollutants such as insecticides and industrial wastes and the pollution in lakes may persist for years. We will use a pollution clean-up time constant of 1 year as representing present day conditions. If POLCN is a unity, then the value of POLN should also be a unity to produce equal inflow and outflow rates at the pollution reservoir under 1970 conditions.

The pollution capital multiplier POLCM in Equation 32 represents the influence of capital equipment on the creation of pollution. As the capital equipment per capita of population rises the per capita generation of pollution rises extremely steeply. We take here a per capita pollution generation in the absence of any capital equipment as being .05 of the normal 1970 value. By the time per capita capital equipment has risen to 3 times the 1970 value, we are assuming that pollution generation rises 6 times.

The pollution absorption POLA in Equation 33 will operate from a variable time constant which depends on the pollution ratio itself. The assumption here is that as the environment becomes more and more heavily loaded with pollution, it will become less able to cope with additional pollution and the time constants of clean-up will grow longer. Equation 33 represents the pollution



absorption or clean-up. Equation 34 gives the absorption time which is being assumed as a function of the pollution ratio. There probably is little data on this relationship and I have no good information. The table assumes that when the pollution ratio rises by a factor of 6 from 1970 conditions that the pollution absorption time will rise from one year to ten years. This is based on the assumption that there will be a corresponding ecological damage which will slow down the normal clean-up processes. Furthermore, as the pollution rate rises it is probable that the pollution products will be of kinds which disappear more slowly.

In Equation 35 the fraction of capital investment devoted to agriculture is gradually adjusted in response to the food ratio. As the adequacy of food increases, the fraction of total capital devoted to agriculture is reduced so that the remainder capital investment can be devoted to the material standard of living. Equation 35 is a first order time delay with a delay time of 30 years in making the adjustment in response to the food ratio condition.

Equation 36 gives the relationship which is here assumed between food ratio and the indicated fraction of capital investment going into agriculture. Other formulations might be considered in which the deviation from normal food ratio establishes not an equilibrium value for CIAF but instead a continuous rate of change in CIAF.

(Back in the discussion of Equation 15 the constant for PDN should be 26.5 instead of the 265 that was previously given.)

Equation 36 reflects the pressures to shift capital investment to agriculture as food pressures rise. At 0 food all capital investment would be shifted toward the food growing. As the average food condition for the world as a whole improves, it will of course happen unequally and those areas and individuals who are meeting their food needs will begin to shift some of the productive assets into non-agricultural channels.

Equation 37 for the human quality of life is a measure of human satisfaction. It can be taken as a utility or performance measure of a system. The composite quality of life measure is obtained by combining a coefficient QLS representing the average quality of life in 1970, with multipliers representing inputs from the material standard of living, crowding, food supply, and pollution.

Equation 38 describes the contribution to quality of life from the material standard of living. It rises steeply and then progressively levels out to represent the declining utility of additional increments in capital investment.

Equation 39 represents the contribution to quality of life from crowding. The crowding ratio of unity represents 1970 conditions with a unity output to the total quality of life. The curve reflects the belief that crowding

has already substantially reduced the quality of life and that substantial further reductions will occur if the crowding rises a factor of 5 above that at the present time. One should remember that this measure of quality of life represents the influence of crowding for its own sake. The affect of crowding on the food supply and on pollution are represented in other variables.

Equation 40 measures the contribution to quality of life from food adequacy. This is also a function which rises more steeply at first and then gradually levels out as the food becomes more than sufficient.

Equation 41 is the contribution to quality of life from environmental pollution. As pollution rises the quality of life will continue to be degraded.



# World2 Madtrn

## \* World Dynamics 1

$$1 \quad L \quad P.K = P.J + (DT)(BR.JK - DR.JK)$$

$$1.1 \quad N \quad P = PI$$

$$1.2 \quad C \quad PI = 1.65E9$$

$$2 \quad R \quad BR.KL = (P.K)(BRN)(BRFM.K)(BRMM.K) \\ (BRCM.K)(BRPM.K)$$

$$2.1 \quad C \quad BRN = .045$$

$$3 \quad A \quad BRMM.K = TABLE(BRMMT, MSL.K * BRMS, 0, 15, 2.5)$$

$$3.1 \quad T \quad BRMMT = .7/1.5/2.1/2.2/1.8/1.1/.8$$

$$3.2 \quad C \quad BRMS = 1$$

$$4 \quad A \quad MSL.K = (MSLN)(ECIR.K)$$

$$4.1 \quad C \quad MSLN = 1$$

$$5 \quad A \quad ECIR.K = (CIR.K)(1 - CIAFK)(NREM.K)$$

$$6 \quad A \quad NREM.K = TABLE(NREMT, NRFR.K, 0, 1, .25)$$

$$6.1 \quad T \quad NREMT = 0/.15/.5/.85/1$$

$$7 \quad A \quad NRFR.K = NR.K / NRI$$

$$8 \quad L \quad NR.K = NR.J + (DT)(-NRUR.JK)$$

$$8.1 \quad N \quad NR = NRI$$

$$8.2 \quad C \quad NRI = 900E9$$

$$9 \quad R \quad NRUR.KL = (P.K)(NRUN)(MSL.K)$$

$$9.1 \quad C \quad NRUN = 1$$

$$10 \quad R \quad DR.KL = (P.K)(DRN)(DRMM.K)(DRPM.K) \\ (DRFM.K)(DRCM.K)$$

$$10.1 \quad C \quad DRN = .025$$

$$11 \quad A \quad DRMM.K = TABHL(DRMMT, MSL.K \times DRMS, 0, 5, .5)$$

$$11.1 \quad T \quad DRMMT = 2/1.4/1/.8/.7/.6/.53/.5/.5/.5/.5$$

$$11.2 \quad C \quad DRMS = 1$$

$$12 \quad A \quad DRPM.K = TABLE(DRPMT, POLR.K, 0, 6, 1)$$

$$12.1 \quad T \quad DRPMT = 1/1.1/1.3/1.6/2.2/3.4/6$$

$$13 \quad A \quad DRFM.K = TABHL(DRFMT, FR.K, 0, 2, .25)$$

$$13.1 \quad T \quad DRFMT = 30/2.4/1.5/1.2/1/.9/.8/.73/.7$$

$$14 \quad A \quad DRCM.K = TABLE(DRCMT, CR.K, 0, 5, 1)$$

$$14.1 \quad T \quad DRCMT = 1/1.1/1.3/1.6/2.1/3$$

$$15 \quad A \quad CR.K = (P.K)/(LA \times PDN)$$

$$15.1 \quad C \quad LA = 135 E6$$

$$15.2 \quad C \quad PDN = 2.65$$

$$16 \quad A \quad BRCM.K = TABLE(BRCMT, CR.K, 0, 5, 1)$$

$$16.1 \quad T \quad BRCMT = 1/.95/.8/.7/.65/.65$$

$$17 \quad A \quad BRFM.K = TABLE(BRFMT, FR.K, 0, 2, .15)$$

$$17.1 \quad T \quad BRFMT = 0/.4/1/1.8/3$$

$$18 \quad A \quad BRPM.K = TABLE(BRPMT, POLR.K, 0, 6, 1)$$

$$18.1 \quad T \quad BRPMT = 1/.98/.95/.9/.8/.65/.5$$



- 19 A  $FR.K = (FPCI.K)(FCM.K)(FP\Delta M.K)$  ✓
- 21 A  $FPCI.K = TABLE(FPCIT, CIRA.K, 0, 5, 1)$  ✓
- 21.1 T  $FPCIT = .5/1/1.4/1.7/1.9/2.05/2.2$  ✓
- 22 A  $CIRA.K = (CIR.K)(CIAF.K)$  ✓
- 20 A  $FCM.K = TABLE(FCMT, CR.K, 0, 5, 1)$  ✓
- 20.1 T  $FCMT = 3/1.6/1/.6/.4/.3/.2$  ✓
- 23 A  $CIR.K = CI.K/P.K$  ✓
- 24 L  $CI.K = CI.J + (DT)(CI\&.JK - CID.JK)$  ✓
- 24.1 N  $CI = CII$  ✓
- 24.2 C  $CII = .4E9$  ✓
- 25 R  $CI\&.KL = (P.K)(CIPC.K)(CI\&C)$  ✓
- 26 A  $CIPC.K = TABLE(CIPC.T, MSL.K, 0, 5, 5)$  ✓
- 25.1 C  $CI\&C = 1$  ✓
- 26.1 T  $CIPC.T = .02/.05/.15/.30/.50/.75$  ✓
- 27 R  $CID.KL = (CI.K)(CIDN)$  ✓
- 27.1 C  $CIDN = .025$  ✓

28 A FPM .K = TABLE(FPMT, POLR.K, 0, 6, 1)  
 28.1 T FPMT = 1/.95/.8/.6/.4/.25/.15  
 29 A POLR.K = POL.K/POLS  
 29.1 C POLS = 3.6E9  
 30 L POL.K = POL.J + (DT) (POLG.SK - POLA.SK)  
 30.1 N POL = POLI  
 30.2 C POLI = .2E9  
 31 R POLG.KL = (P.K)(POLN)(POLCM.K)  
 31.1 C POLN = 1  
 32 A POLCM.K = TABLE(POLCMT, CIR.K, 0, 5, 1)  
 32.1 T POLCMT = .05/1/3/6/10/15  
 33 R POLA.K = POL.K/POLAT.K  
 34 A POLAT.K = TABLE(POLATT, POLR.K, 0, 6, 1)  
 34.1 T POLATT = .5/1/2.4/4.4/6.8/9.6/11.4  
 35 L CIAF.K = CIAF.J + (DT/CIAFT)(CFIFR.J - CIAF.J)  
 35.1 N CIAF = CIAFI  
 35.2 C CIAFI = .5  
 35.3 C CIAFT = 30  
 36 A CFIFR.K = TABLE(CFIFRT, FR.K, 0, 2, .5)  
 36.1 T CFIFRT = 1/.8/.5/.2/.1



(HCS)

37 A HCL.K = A(HCM.K)(HCC.K)(HCF.K)(HCPOL.K)  
37.1 C HCS = 1  
38 A HCM.K = TABLE(HCMT, MSL.K, 0, 5, 1)  
38.1 T HCMT = .2/1/2.2/4/6/8  
39 A HCC.K = TABLE(HCCT, CR.K, 0, 5, .5)  
39.1 T HCCT = 2/1.3/1/.75/.55/.45/.38/.3/.25/.22/.2  
40 A HCF.K = TABLE(HCFT, FR.K, 0, 2, .5)  
40.1 T HCFT = 0/.2/1/2.2/4  
41 A HCPOL.K = TABLE(HCPOLT, POLR.K, 0, 6, 1)  
41.1 T HCPOLT = 1.5/1/.7/.5/.35/.25/.2

Note

Note Control cards

Note

C DT = .2

C LENGTH = 200

C PLTPER = 2

N TIME = 1900

PLOT P = P/NR = N/CI = C/POL = \*/CIAF = A/  
HCL = H/MSL = M/FR = F/POLR = 2/CR = R

World 1

7/5-8 (CP) PDN = 26.5 error in orig. calculations

7/5-9 (CP) PDN = 26.5  
T CIPCT = .02/.05/.1/.14/.16/.18 } To suppress the  
excess capital  
formation when  
population falls

7/5-10 (CP) PDN = 26.5  
(TP) CIPCT = .02/.05/.1/.14/.16/.18  
T POLATT = .5/1/1.6/2.4/3.2/4/4.8

7/5-11 (CP) PDN  
(TP) CIPCT  
(TP) POLATT = .5/1/1.6/2.4/3.2/4/4.8  
(CP) CII = .8 E9  
(CP) CIAFI = .31

7/5-12 (CP) PDN  
(CP) CIPCT  
(TP) POLATT  
(CP) CII  
(CP) CIAFI  
C BRN = .06



# World 1 model.

Run

7/5-1       $CI&C = .5$       slower capital accumulation  
(slows growth, postpones crisis)

7/5-2       $CI&C = .5$       slower cap. accum.  
 $CI&FI = .25$       smaller cap. alloc to agri to start

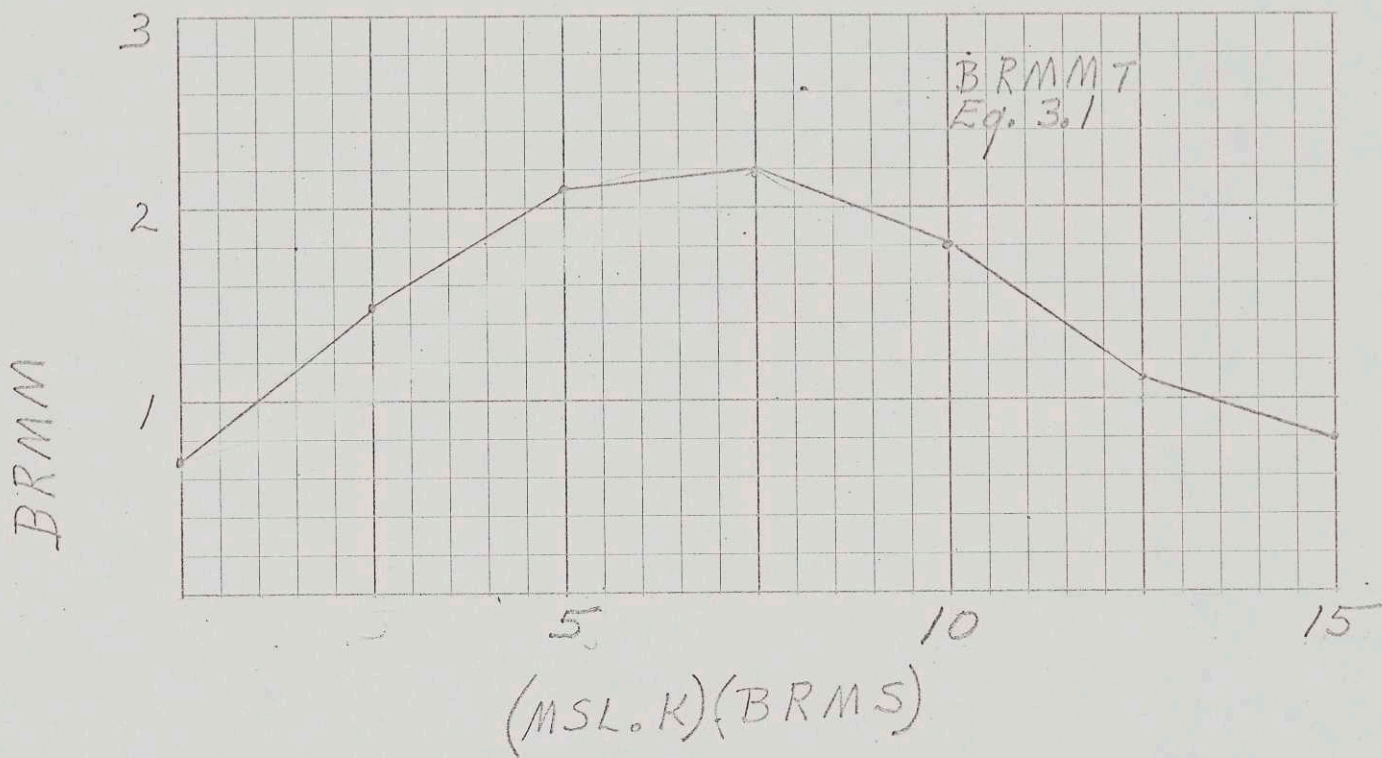
7/5-3       $CI&C = .5$   
 $CI&FI = .25$   
Length = 2500  
Pltper = 5

(Population collapse delayed til 2125)  
reduced normal birth to normal death. (Population collapse delayed to year 2000.)

7/5-5       $CI&FI = .3$  } intermediate growth between  
 $BRN = .035$  } std. and run 7/5-4.

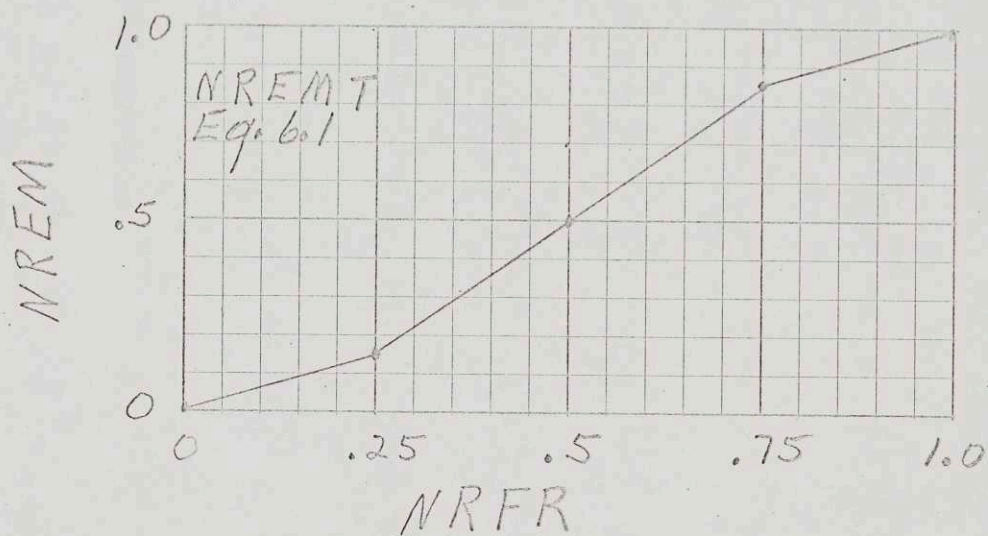
7/5-6       $CI&FI = .3$   
 $BRN = .032$   
Length = 2000  
Pltper = 1

7/5-7       $POLS = 10E9$

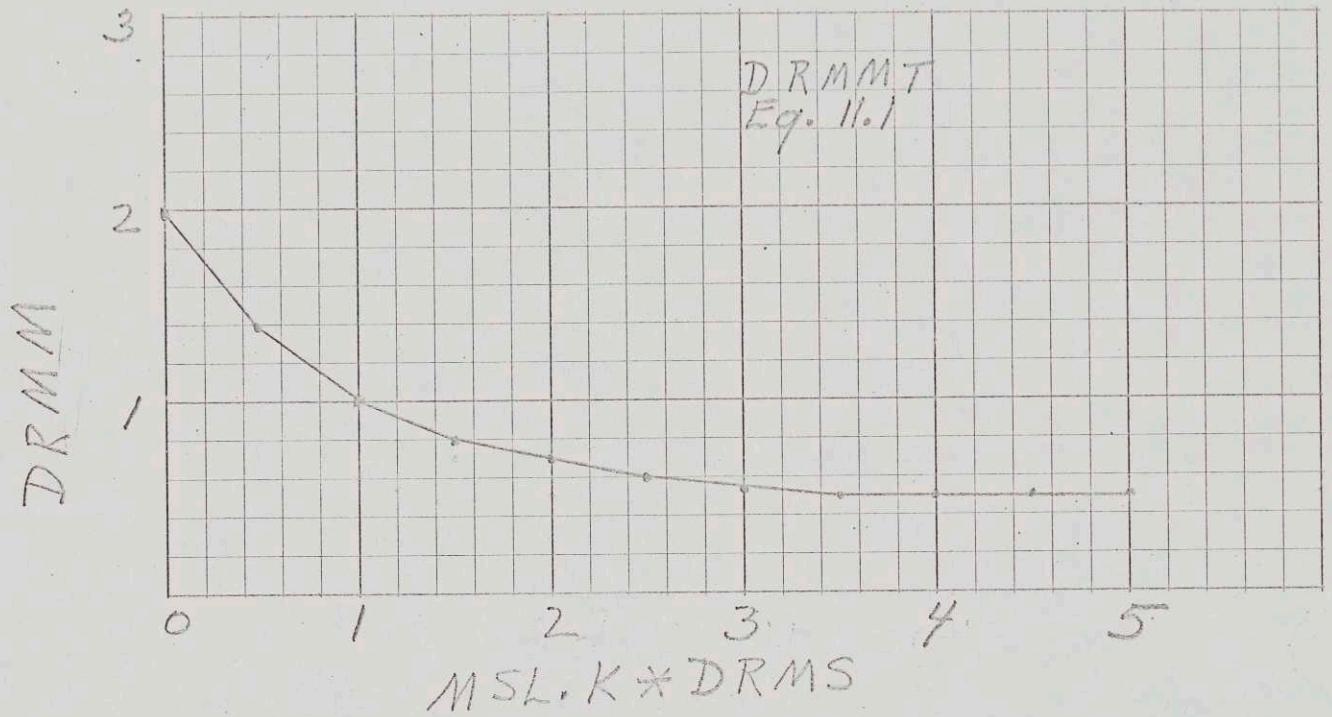


Birth-rate material multiplier  
vs. material standard  
of living



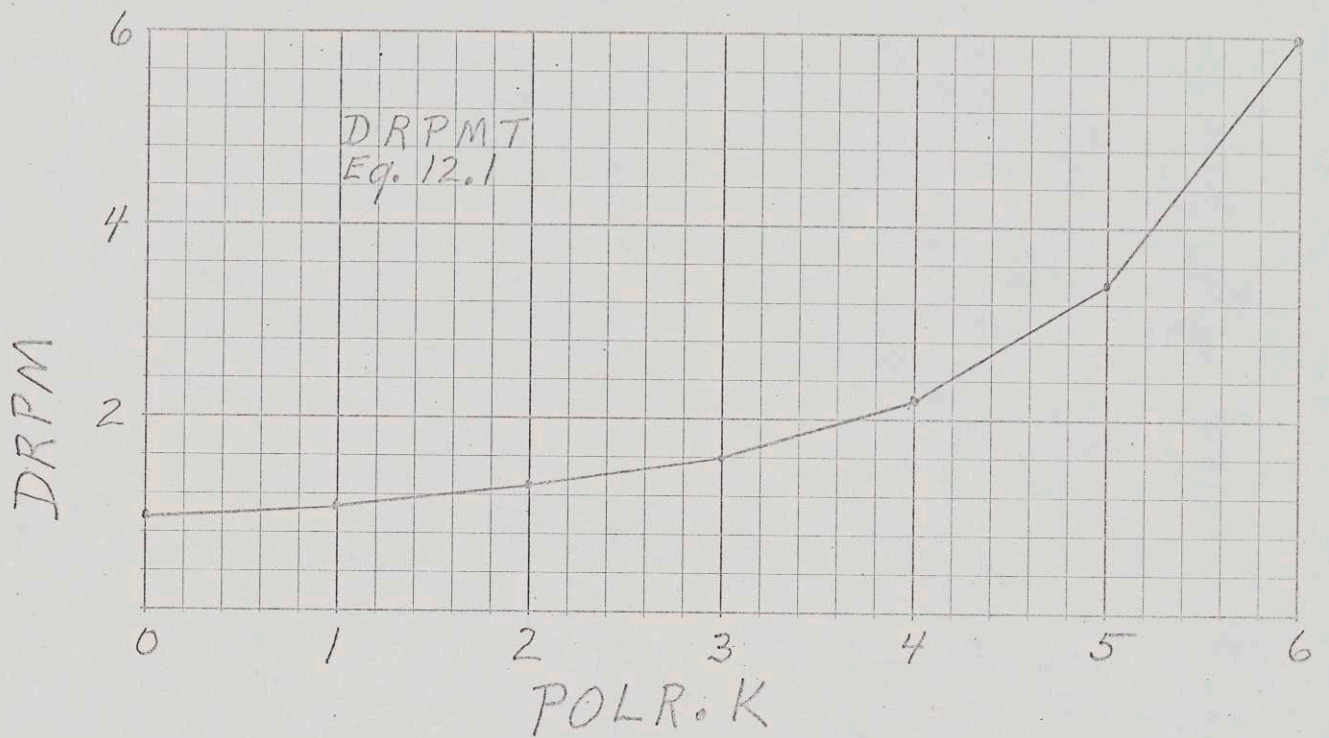


natural resource extraction  
multiplier vs. natural  
resource fraction remaining

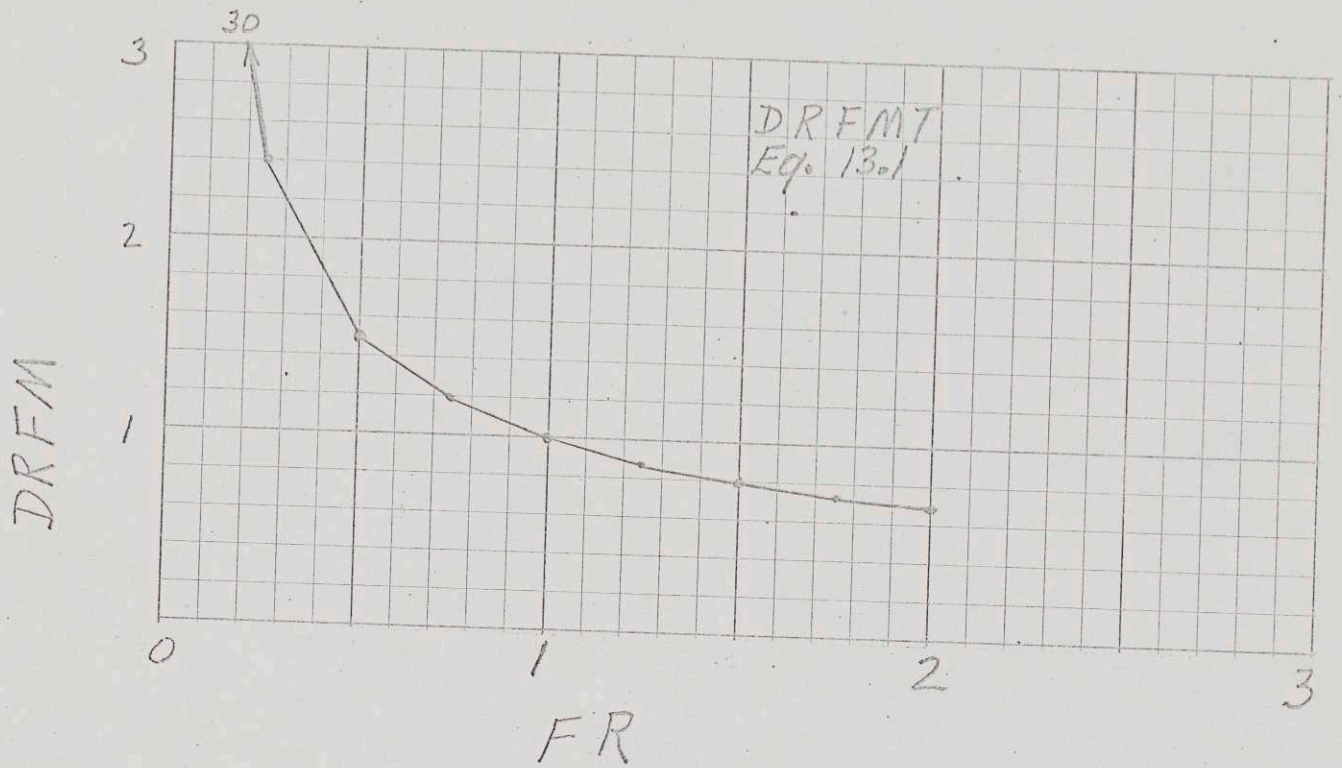


Death-rate material-multiplier  
vs. material standard  
of living



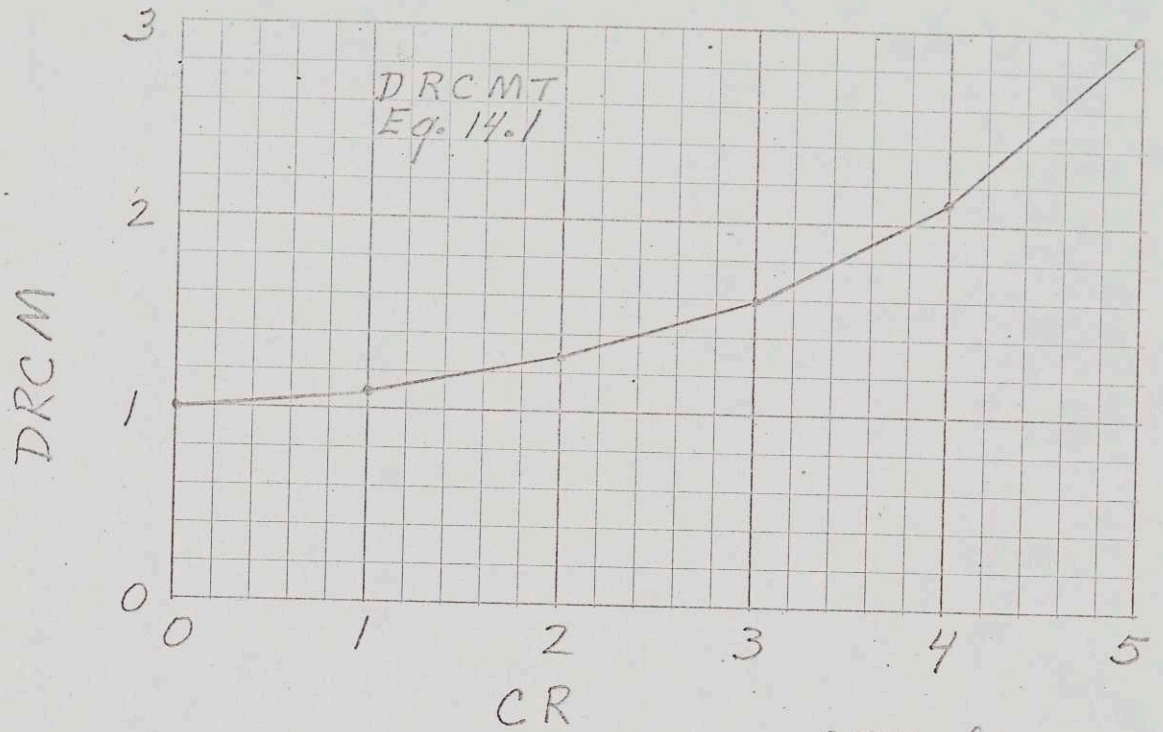


Death-rate pollution-multiplier vs  
pollution ratios

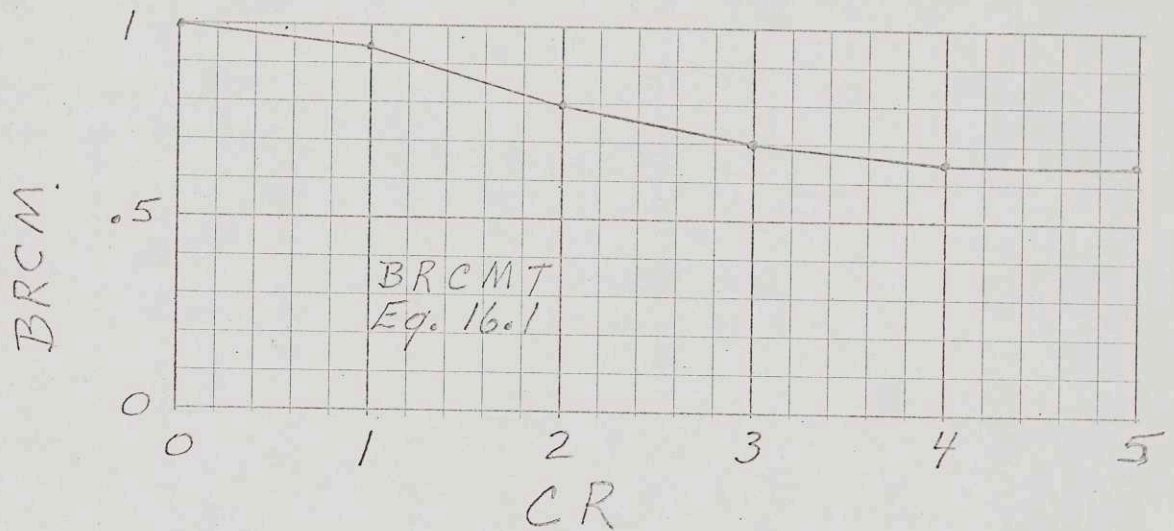


Death-rate food-multiplier vs.  
food ratio



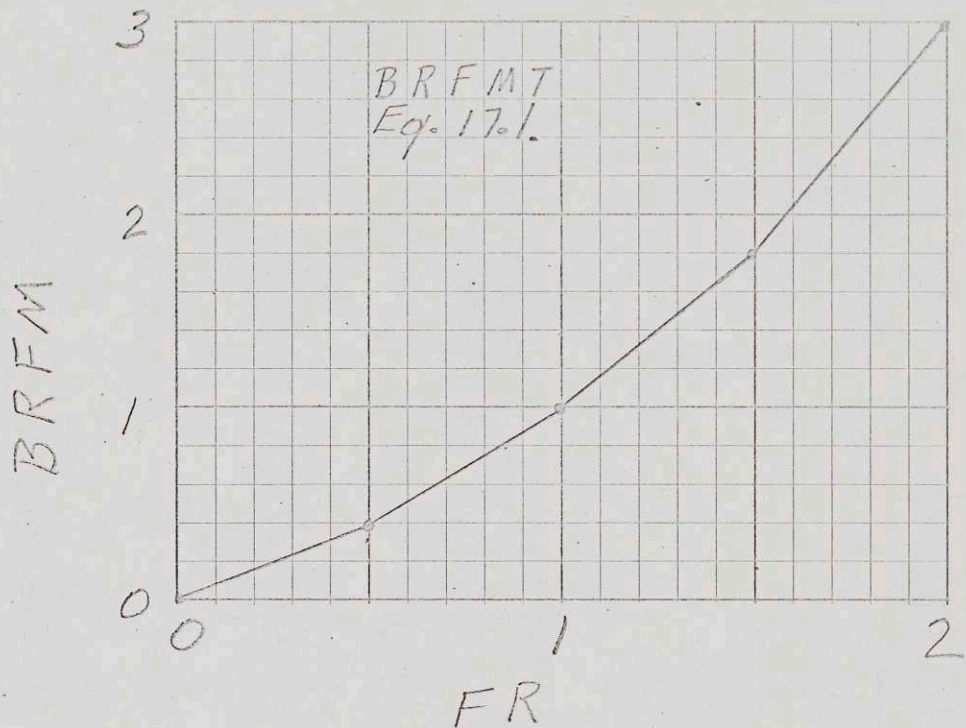


Death-rate crowding multiplier  
vs. crowding ratio

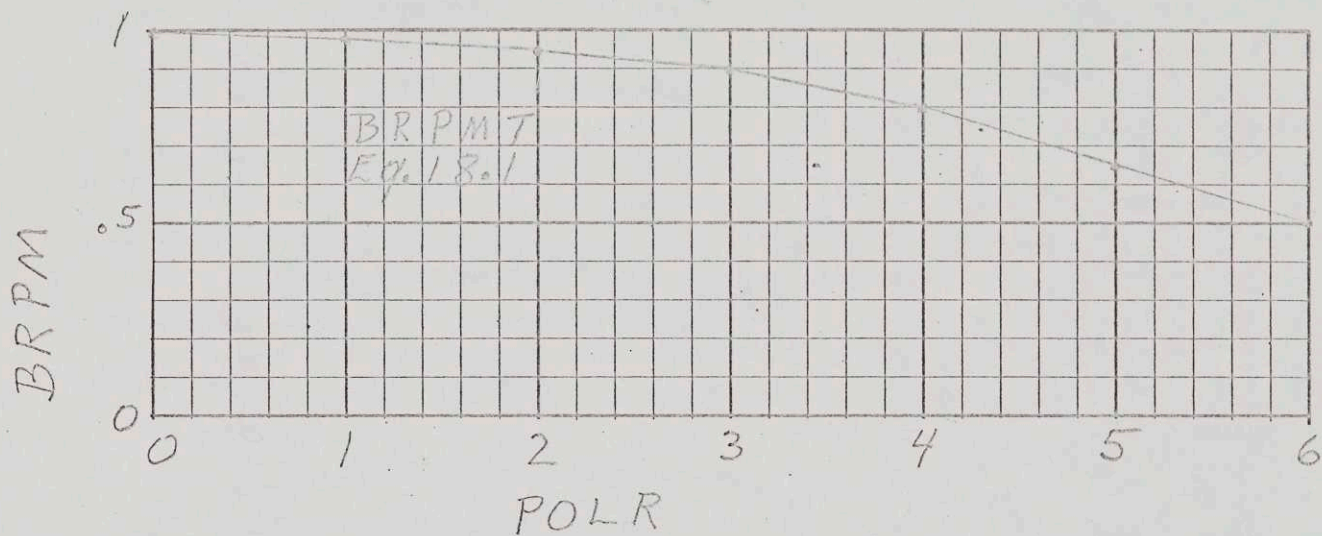


Birth-rate crowding-multiplier vs.  
crowding rates



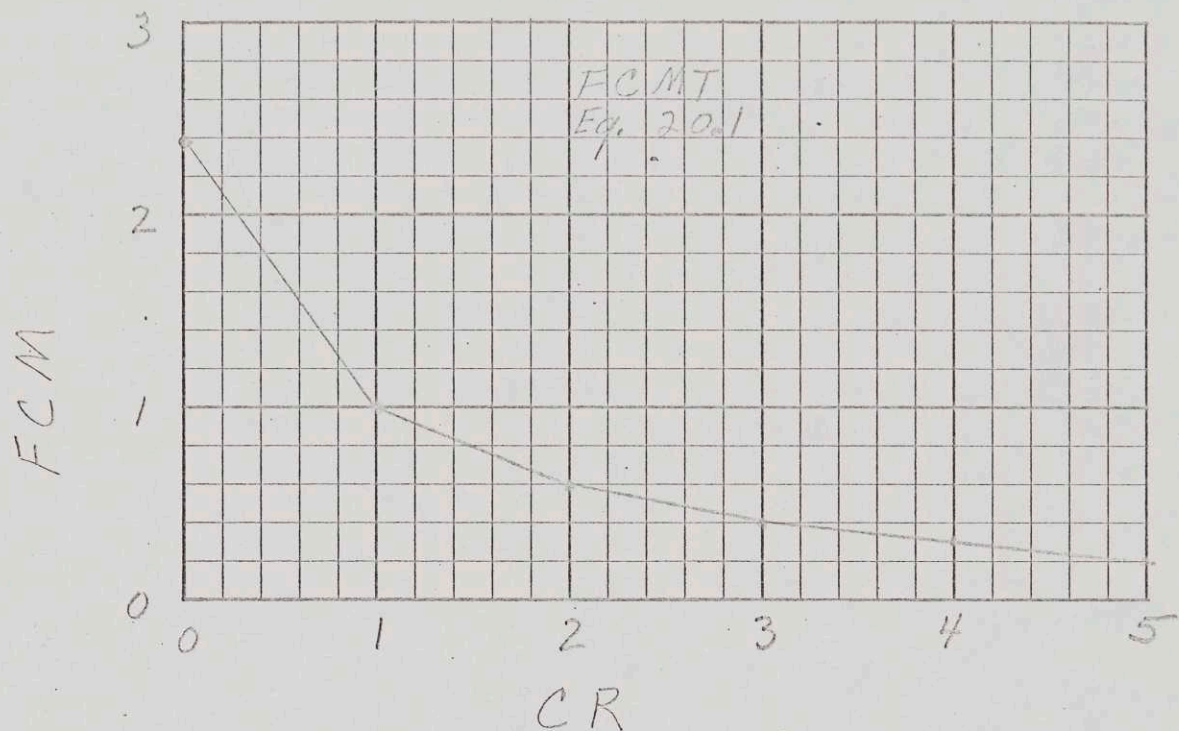


Birth-rate food-multiplier vs  
food ratio

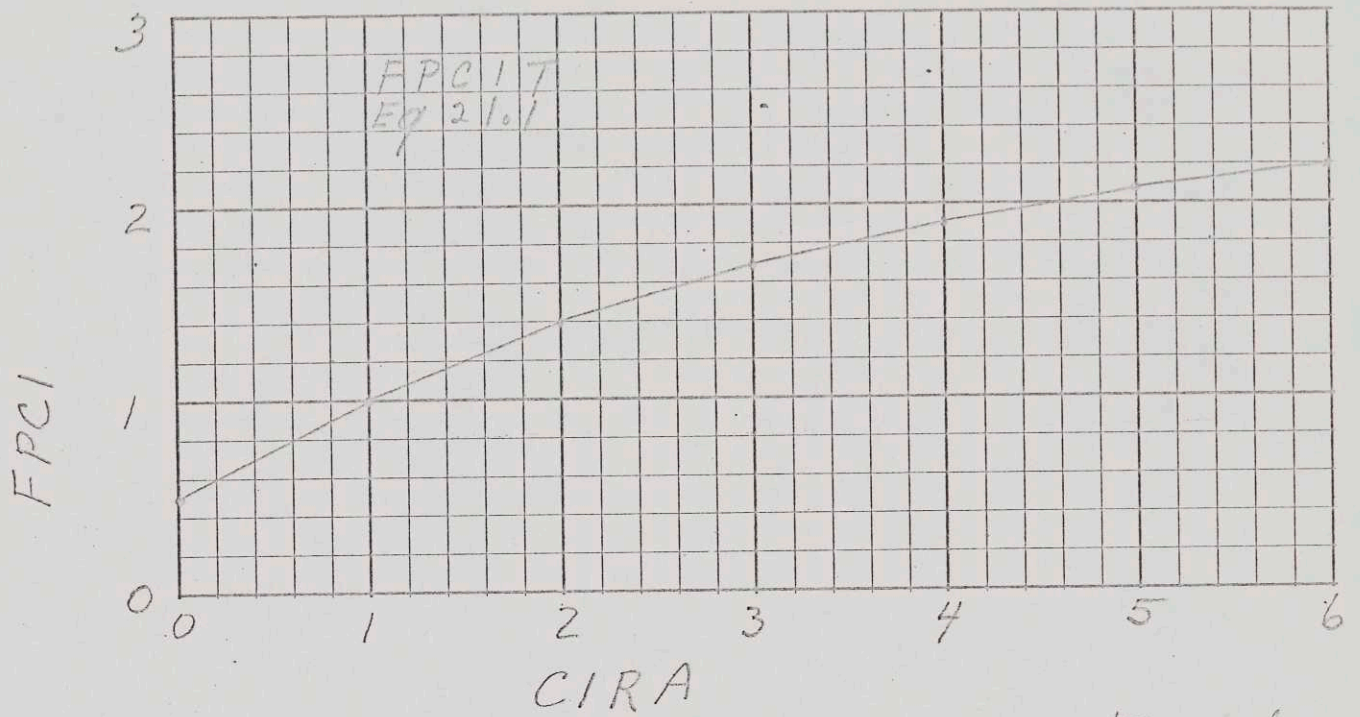


Birth-rate pollution-multiplier vs  
pollution ratio



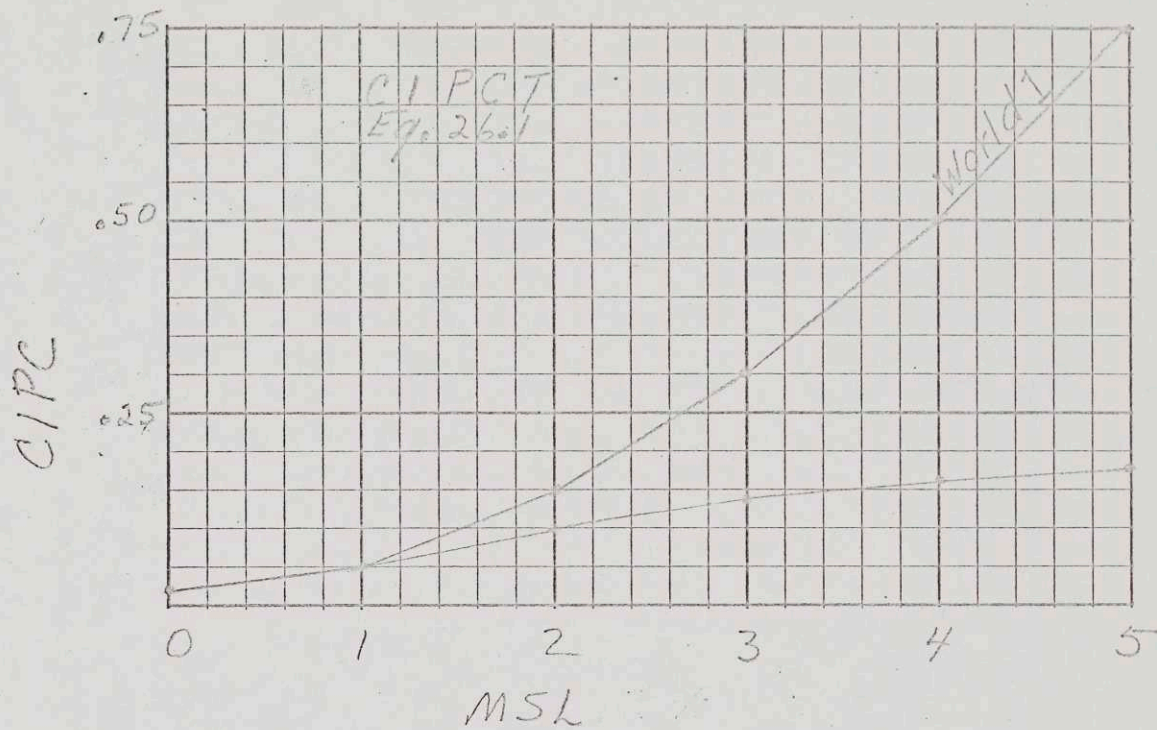


Food crowding-multiplier vs.  
crowding ratio

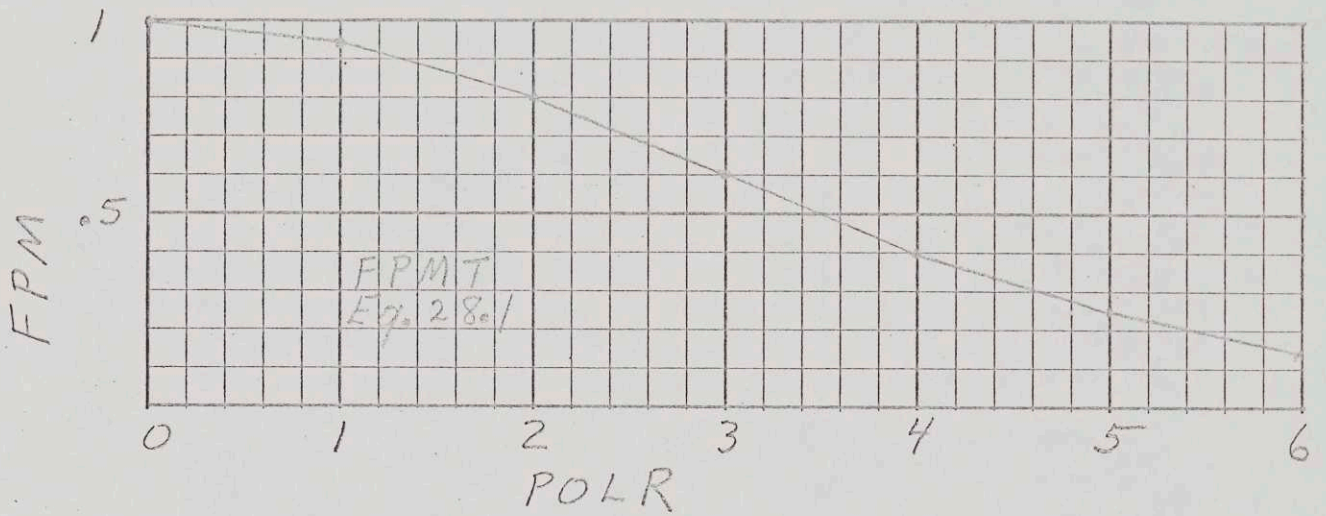


Food potential from capital investment  
vs. capital investment ratio in  
agriculture.



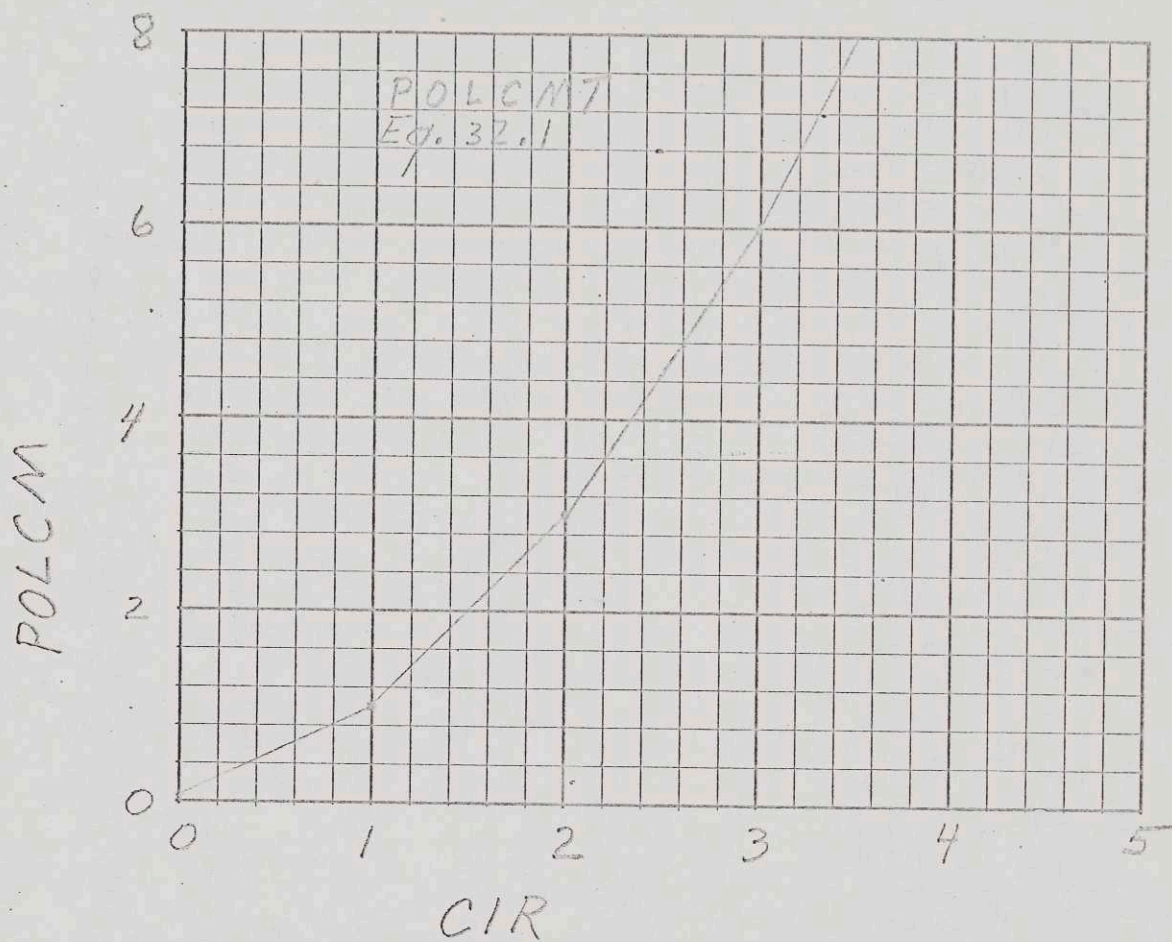


Capital investment per capita  
vs. material standard of living

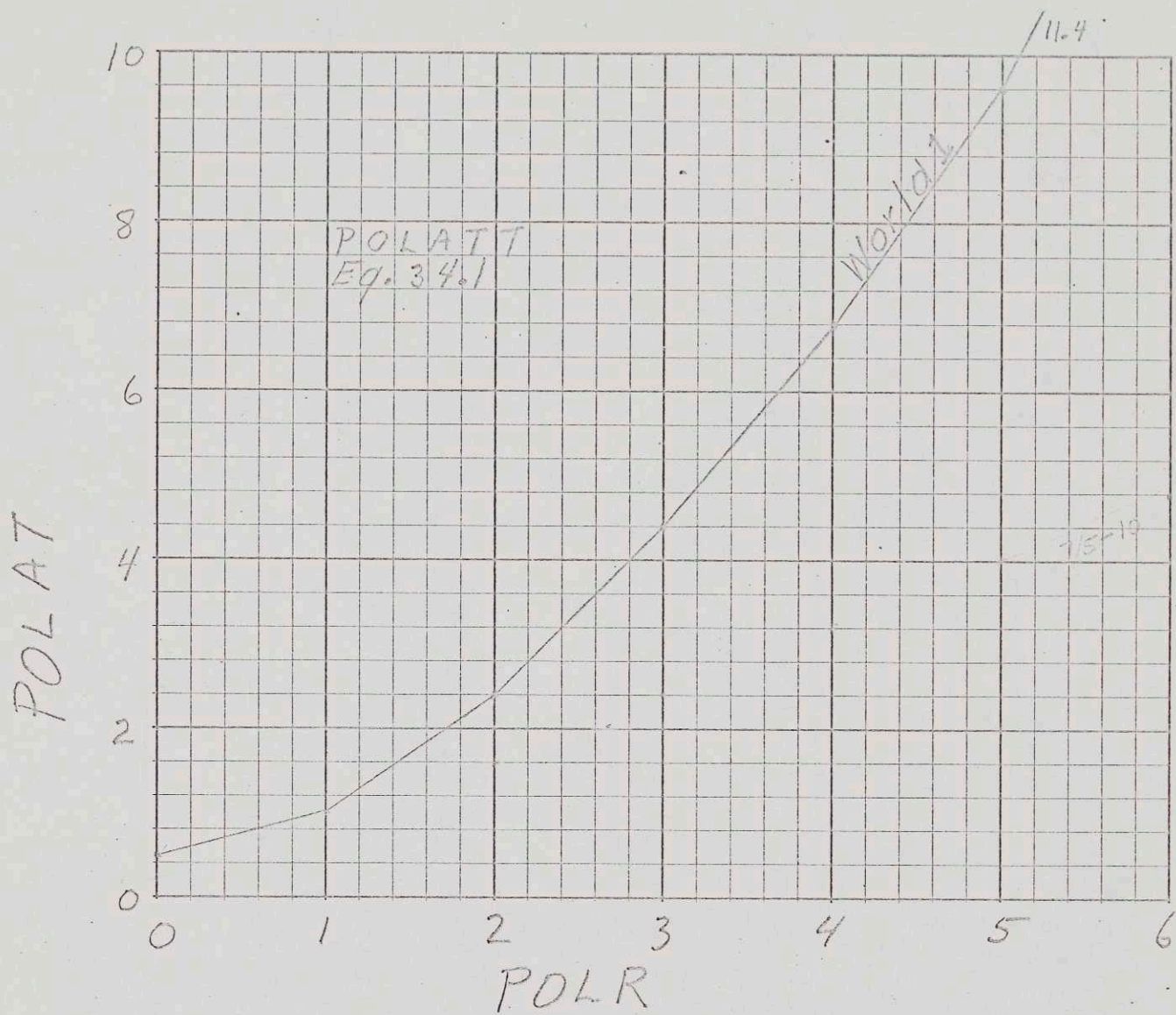


Food pollution-multiplier vs.  
pollution ratio



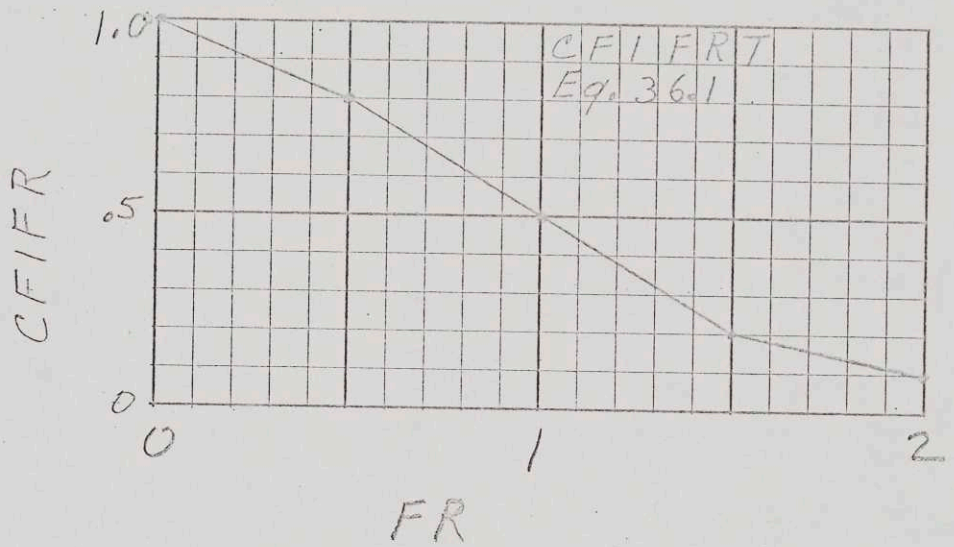


Pollution capital-multiplier  
vs capital-investment ratios

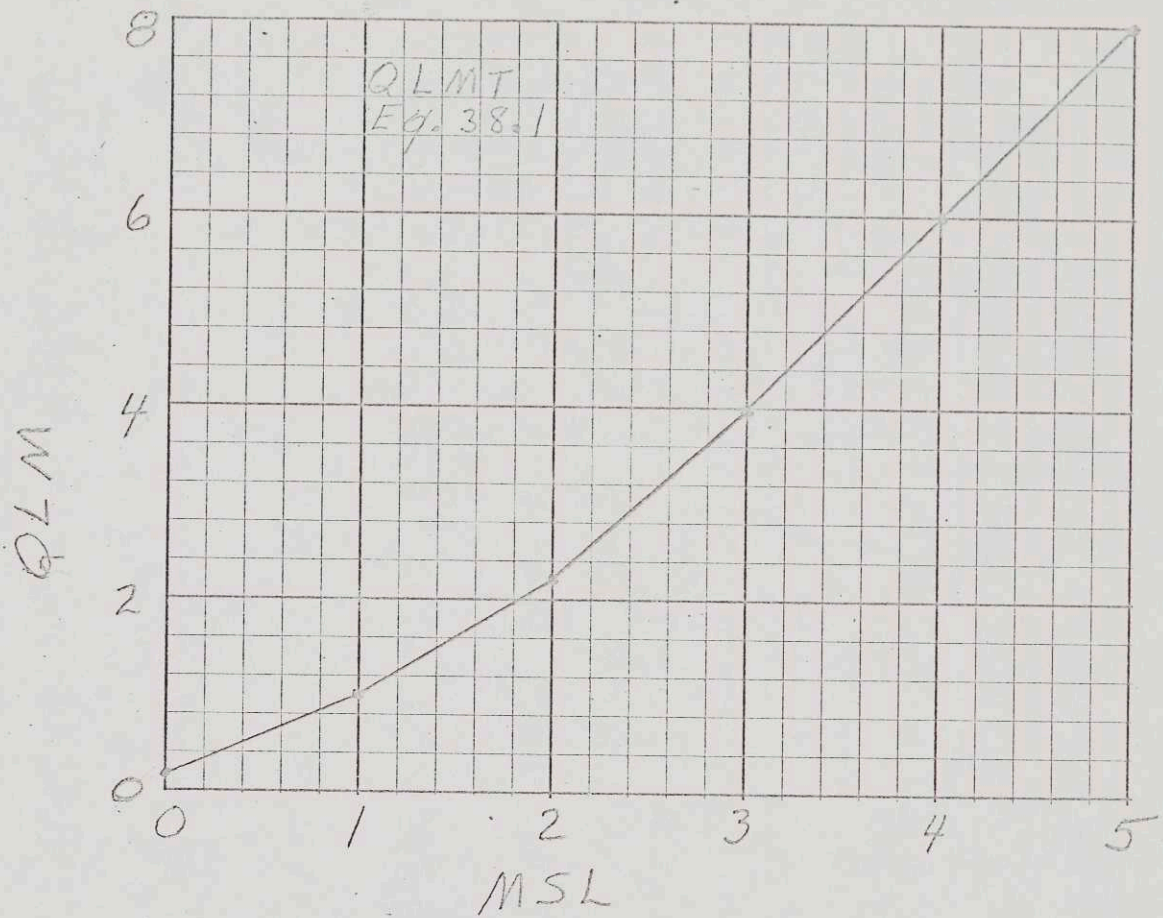


Pollution absorption time vs  
pollution ratio





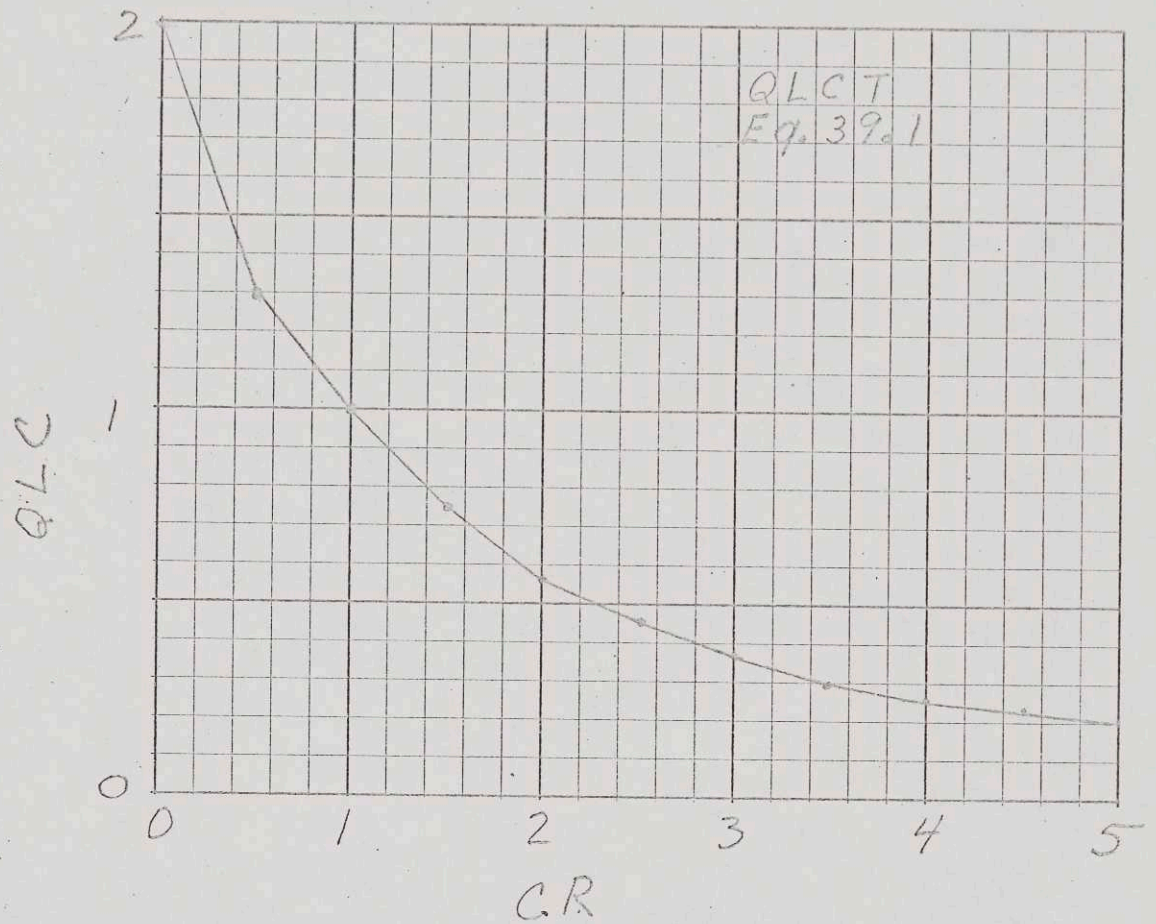
Capital fraction indicated by  
food ratios vs. food ratios



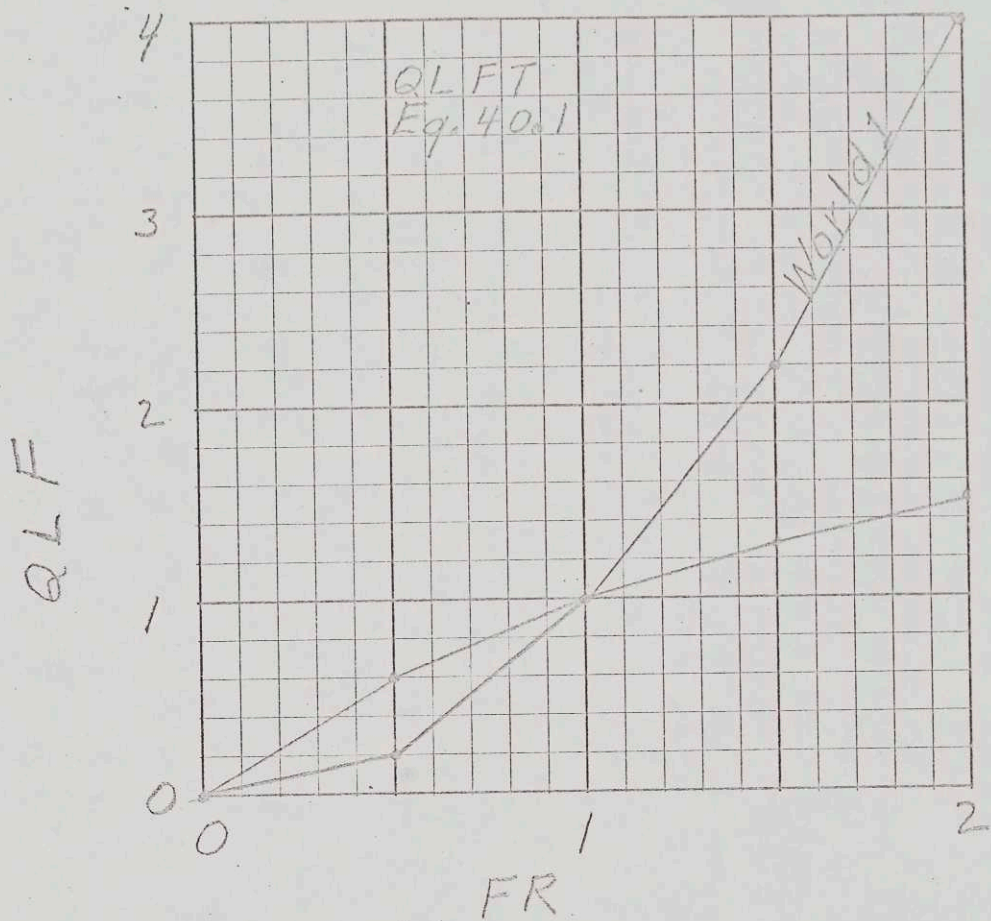
Quality of life from material vs.  
material standard of living

Revised for World 2





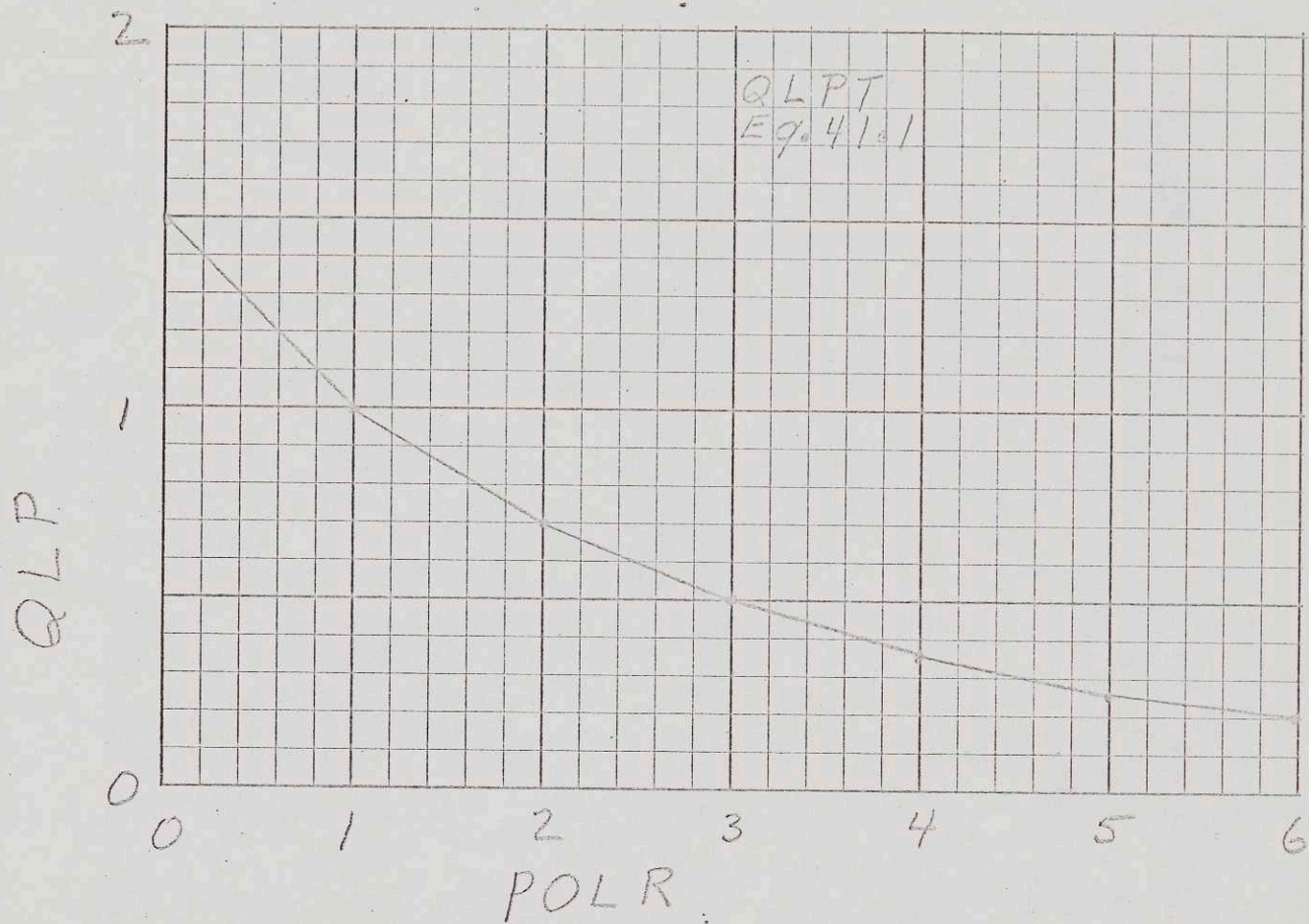
Quality of life from crowding  
vs crowding ratio



Quality of life from food is  
food ratios

Revised for World 2





Quality of life from pollution  
vs pollution ratio



Massachusetts Institute of Technology  
Alfred P. Sloan School of Management  
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July 3, 1970

Memorandum

To: MEMBERS OF THE CLUB OF ROME

From: PROF. JAY W. FORRESTER

Subject: SEMINAR IN CAMBRIDGE, MASSACHUSETTS, JULY 20-JULY 31 ON THE  
DYNAMICS OF SOCIAL SYSTEMS

A meeting of the Club of Rome was held in Bern, Switzerland on June 29 and 30. This letter is addressed primarily to the members who were not present at that meeting.

You have already received descriptions of the proposed Club of Rome project dealing with the future trends in the world situation. During discussion of the project, it developed that suitable methodology for dealing with the dynamics of social systems did not exist within the project plans and also that financial support for the project was being delayed by the absence of a visible methodology.

I suggested to the members present in Bern that we believe we have a suitable methodology here at MIT, developed in connection with our work in the dynamics of managerial systems and broader social systems. I am speaking of the methods used initially in my book, Industrial Dynamics, and more recently in my book Urban Dynamics (both published by the MIT Press).

At the meeting in Bern, an invitation was extended to the Executive Committee of the Club of Rome to come to the Massachusetts Institute of Technology for a period of two weeks to evaluate for themselves the relevance of these methods and approaches. That invitation was accepted and the meeting will be held the last two weeks of July.

Several members of the Club of Rome who are not on the Executive Committee indicated that they wished to attend the meeting at their own expense. This letter is to invite any other members to join with us for the period from July 20 through July 31. It is my understanding that the Club of Rome will not be able to pay expenses. Transportation, meals and hotel accommodations will be the responsibility of the individual member. There will be no charge for attendance at the symposium itself.

If you wish to attend, please let me know by telephone or cable; time for making arrangements is very short. We will arrange a block of hotel rooms and try to handle other local arrangements.



The plan will be for lectures in the mornings.. The afternoons will be devoted to guided work sessions in which the individual members will obtain experience with modeling and computer simulation of a simplified social system. The objective will be to convey sufficient knowledge and experience to permit evaluation of the methodology in the context of the larger goals of the Club of Rome.

All members will receive additional material about the meeting whether or not they have indicated plans to attend. Please notify me as soon as possible whether or not you will attend so we will know definitely what to expect. A list(probably incomplete)of those attending in Bern is given below in case you wish to contact anyone for additional information.

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USA

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Those Attending in Bern:

M. Serge Antoine	Professor Keichi Oshima
Professor Frits Bottcher	Professor Hasan Ozbekhan
Dr. Jeremy Bray, M. P.	Dr. Aurelio Peccei
Dr. Jakob Burckhardt	Professor Dr. Ing. Eduard Pestel
M. Louis Camu	Dr. John Platt
Professor Jay W. Forrester	Professor Olivier Reverdin
Professeur Jacques Freymond	Dr. Ernesto Sabato
Mr. Pierre R. Gendron	Dr. Hugo Thiemann
Dr. Alexander King	Dr. Bertram D. Thomas
Dr. T. Adeoye Lambo	Dr. Paul A. Weiss

THE CLUB OF ROME

MEMBERSHIP AS OF JUNE 24, 1970

---

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Westminster  
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Dr. Jakob BURCKHARDT  
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Schweizerischen Schulrates  
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*The members  
with numbers  
in circles have  
indicated a  
desire to  
attend* → ① →

*TOTAL LIST - 50  
Not at BERN - 28*



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Banque de Bruxelles  
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Bruxelles

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still  
to send  
books

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Science  
Council of  
Canada  
may not be  
able to come

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Carnegie Institution of Washington  
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Mr. Daniel JANSSEN  
Director-Deputy General Manager  
Union Chimique Belge  
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Center for Advanced Visual Studies  
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Comm.*

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Senior Vice President  
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Dr. Koji KOBAYASHI  
President  
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Dr. Max KOHNSTAMM  
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pour les Etudes Universitaires  
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Dr. Thorkil KRISTENSEN  
Institute for Development Research  
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1250 Copenhagen

*no. 11 →  
Going to Japan*



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Vice-Chancellor  
University of Ibadan  
Ibadan, Nigeria

Senator Maurice LAMONTAGNE  
The Senate  
Centre Block, Room 457-S  
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M. Robert LATTES  
Directeur Général Adjoint  
Groupe SEMA-SIA  
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Special Representative of the Chairman  
The Urban Coalition  
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Profesor Dr. Julio H. G. OLIVERA (^)  
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*kāchē*

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Senator Claiborne PELL  
The Senate of the United States  
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Dr. Jacques SPAEY  
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Commission Interministerielle  
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Directeur Général  
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Nobel Institute of the Royal  
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X  
Professor Carroll L. WILSON  
Sloan School of Management  
Massachusetts Institute of Technology  
50, Memorial Drive  
Cambridge, Mass. 02139

(^) To be confirmed by Executive Committee

NOTE: Other candidates have already been considered  
at Club meetings. Selection and cooptation of  
a number of them is presently under way.

# THE CLUB OF ROME

## GENERAL MEETING OF THE CLUB OF ROME

Bern, Monday June 29, 1970

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### PROGRAMME

- 9.30 a.m. Registration of Participants
- 10.30 a.m. Informal Meeting of Participants
- 1.00 p.m. Lunch
- 3.00 p.m. General Assembly of the Club of Rome

#### Agenda

1. Report on activity
  2. The "Predicament of Mankind" Project
  3. Other future activities
  4. Membership
  5. Executive Committee
  6. Incorporation
  7. Funding
  8. Relations with other Organizations
  9. Conference with Swiss Authorities and Personalities (June 30, 1970)
  10. Others
- 6.00 p.m. Press briefing
  - 8.00 p.m. Dinner

The Assembly will be held in English.



MEETING OF THE CLUB OF ROME  
on invitation of the Swiss Government  
Bern, Tuesday June 30, 1970

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PROGRAMME

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- 9.00 a.m. Opening of the session  
Chairman : Professor Olivier REVERDIN, President, Consultative Assembly of the Council of Europe, President of Swiss Science Council, Member of the Swiss House of Representatives
- 9.15 a.m. The critical world situation  
Professor Jacques FREYMOND, Directeur, Institut Universitaire de Hautes Etudes Internationales
- 9.45 a.m. What has been done to face this situation  
Dr. Alexander KING, Director General for Scientific Affairs, O.E.C.D.
- 10.00 a.m. Why the Club of Rome  
Professor Dr. Ing. Eduard PESTEL, Rektor, Institut für Mechanik, Technische Universität Hannover
- 10.15 a.m. The activities of the Club of Rome  
Dr. Aurelio PECCETI, Managing Director, Italconsult, Roma
- 10.30 a.m. Coffee break
- 11.00 a.m. Presentation of the Project "Predicament of Mankind"  
Professor Hasan OZBEKHAN, General Manager International Development and Director of Planning, Worldwide Information Systems Inc., Los Angeles
- 11.30 a.m. The framework for the execution of the Project in Switzerland  
Dr. Hugo THIEMANN, Directeur Général, Institut Battelle, Geneva
- 1.00 p.m. Luncheon given by the Swiss Federal Council in honour of the Club of Rome and Swiss guests
- 3.00 p.m. Debate
- 4.30 p.m. Summary and conclusion



"THE PREDICAMENT OF MANKIND PROPOSAL"ABSTRACT

Despite its great diversity, its pluralism and its traditional divisions, the world today is rapidly becoming one world. Man's immense technological achievements have plunged him into a maelstrom of events whose impacts and reverberations are global; whose overlaps and cross-currents create problems that are highly interactive. These events with their ill-defined boundaries and their increasingly harsh consequences, form a massive and dynamic conjuncture that should be recognized as a totality -- a constantly changing, highly complex, essentially indivisible, worldwide continuum.

If this indivisible continuum of events is a reality, it is one that we seem poorly prepared to accept. Despite all its achievements, our technoscientific society has failed to provide us with the ethic, ideals, institutions and policies vital to the functioning of an interdependent world. We are beset with lags, gaps, imbalances and dissonances that occur and keep recurring at all levels of perception, experience and decision. We are threatened by nuclear escalation, by insidiously spreading conflicts, by imminent large-scale hunger, by over-population, by the spoilage of our environment, by the alienation of our youth, by the breakdown of our participatory processes, and by increasing institutional insufficiency and rigidity.

What are we doing about it? The situation is so new that we have not yet evolved the methods, let alone the attitudes or outlooks that may permit us to overcome it. We therefore try to cope with it in the light of what our traditions have taught us: we fragment reality as best we can into single well bounded "problems", and attempt to deal with each of these separately and in its own terms. By doing this we seek to isolate and scale down the problems to the size of the answers we know how to give. As a result all the singular solutions we devise are rendered ineffective



or irrelevant by the all-pervasive momentum that animates the root-issues, and by the larger context that contains them. They take on the aspect of stop-gap activities which, in themselves, often exacerbate the situation as a whole, while accelerating its already complex dynamics. Furthermore, those approaches that insist both on step-by-step and parallel problem-solving seem to have such a grip on our minds that they preclude our devoting sufficient time or energy to the systematic determination of what gives rise to these critical imbalances, or to developing methods of prevention --- methods that will clarify our understanding of the dangerous consequences attendant upon unintegrated and fragmentary solutions.

What can we do about it? This is the question that the Club of Rome --- an informal, non-national, non-political group comprising intellectuals, scientists, educators, business leaders, and men of goodwill from most parts of the world and all walks of life --- has set itself the task of trying to answer. Its members are profoundly concerned about our present and the future it portends, which in their view amounts to nothing less than the "predicament of mankind". They believe it is of the utmost urgency to strive to comprehend the nature of this complex, global predicament, to do everything possible to work towards obtaining a new and truer understanding of our reality in its systemic dimensions, and to do this with the aim of reaching a new conception of corrective actions and policies. It hopes that a study which integrates the situation at a higher level of perception, and reveals some of its internal structure, might lead to pertinent insights concerning the dangerous imbalances and dissonances whose quickening dynamic is engulfing us. This kind of study would, hopefully, show that the linear and limited cost-benefit analyses which have heretofore guided us in our decisions is becoming entirely inadequate. When we extend such methods and measurements to cover the total situation, both the notion of cost and that of effectiveness acquire new meanings which might prove useful in clarifying those contexts within which ideas such as dynamic balance could become operational guidelines. Given these guidelines, we might be able to develop still unthought of long-term options, and suggest alternative motivations and actions in policy making.



Further, the Club of Rome recognizes that the value-base for an endeavor that seeks to address itself to our world in all its variety and diversity, must necessarily be made broad enough to transcend differences in historic development, in traditions, in cultural evolution and in the attitudes that these differences generate. The value-base must be relevant to individual, social, political, and environmental concerns, for these are inextricably intermixed in a world that can perhaps most appropriately be described as an evolutionary eco-system, comprising both natural phenomena and human experience, whose boundaries have now, irreversibly, reached the physical frontiers of the planet Earth.

The aim of the project is to think creatively or inventively, rather than to concentrate on in-depth research -- of which a great deal is going on in many places. Consequently, the methodologies to be adopted should be flexible, wholly transdisciplinary, and often heuristic. Those who propose this project are aware that it might not succeed -- or that it might succeed in ways other than those that have been foreseen. Nevertheless, they are convinced that the very attempt to free our thinking about, and to expand our approaches to, the human condition will, in itself, be of considerable value. It might inspire other, differently conceived, efforts which eventually must and will succeed.

The intent is that the project will be carried out by an interdisciplinary Work Group of about ten selected scientists supported by a large number of consultants who are recognized authorities in specific fields. The work would be done over a period of some fifteen to eighteen months in Switzerland, where the Institut Battelle at Geneva has agreed to provide administrative support and physical facilities.

The initial work of the Group would be to delineate a very coarse-grain model of our situation's general structure, or morphology, with reference to an empirically established list of Continuous Critical Problems. This rough model (or set of related models) would then be systematically investigated through analytic observation or, if possible, through simulations,



in the hope that such a study might yield insights into the behavior of the general system under differing conditions and event-configurations.

Depending upon the degree of success achieved, the findings that result from such efforts might make it possible for anyone or any institution concerned to elaborate suggestions for action that might be of help in the formulation of policy. Both the findings and suggestions of the Work Group would be submitted to representatives of interested governments in some as-yet-to-be-conceived manner and through some as-yet-to-be-conceived means, which the Club of Rome is presently attempting to envision, and which it hopes will emerge as a new type of cooperative effort among people, governments, institutions, and international agencies to the end of evoking a massive "prise de conscience" that might pave the way to world-wide action.

## THE CLUB OF ROME POSTURE AND PROPOSED ACTIVITY

Speech by Dr. A. Peccei at the Berne Conference of June 30, 1970.

1. In the first part of the Conference, we have examined in brief outline, as befits this encounter, the present state of world society, which is becoming alarming from many aspects; then we overviewed what is being done or planned, alas with little prospect of success, to stop the degrading conditions on our planet; and have concluded that it is high time to make a coordinated and perhaps supreme effort to attack the unprecedented tangle of problems confronting mankind.

This is The Club of Rome's posture. You know that it is action-oriented! Let me now try to explain how and why, though a small, private organization, it hopes to have an impact on the overall situation--if it can muster financial means fully to develop its action.

Schematically, its objectives are twofold, and may be pursued in two subsequent though overlapping phases. The first objective is to acquire and diffuse a real, in-depth understanding of the present critical state of human affairs, and of the narrowing and uncertain perspectives and options which are likely for the future if present trends are not corrected. The second objective is, then, to recognize and propose new policy guidelines and patterns of action capable of redressing the situation and keeping it under control.



2. I will to-day concentrate particularly on the first objective and phase. In doing this I may start by highlighting two of the basic shortcomings which account for why man's struggle against the increasingly man-made reality of the modern world is ironically a losing struggle.

The first shortcoming is a misassessment of the time-scale of developments in our epoch. True, we often hear that time is of essence. But the human mind tends to lean on past experience--which nowadays is of little avail, if not altogether misleading. In fact, a technology-generated whirlwind of change, without precedent in man's history, is transforming the world under our eyes. In the matter of one decade or two, the speeds at which we move, communicate, reckon and generally do things, and thus produce events, have increased by orders of magnitude. As a consequence, all heretofore valid time-references have become practically useless. Unable to adjust to this unaccustomed, perhaps unnatural, certainly revolutionary tempo of change, we fight the mounting tide of ever-new problems and difficulties belatedly and with outdated concepts and methods. Thus, while unremittingly engaged, on the one hand, in transforming everything, we are incapable, on the other hand, of rising up to the challenges of this rapidly evolving reality.

The gap has become so large and widening that we are on the verge of disaster on many counts. I for one share UN Secretary General U Thant's concern when he warned the member states that they have perhaps ten years left in

which to subordinate their ancient quarrels and launch a global partnership to curb the arms race, to protect the human environment, to check the population explosion, and to supply the required momentum to world development efforts--because, if such a global partnership is not forged within this decade of the 1970's, these problems might reach such staggering proportions that they will be beyond our capacity to control.

The second shortcoming, which compounds the first one, is the lack of perception of the nature of change under way. Again we tend to rely on retrospective judgment, and react as if we were still faced by the familiar panoply of age-old problems--only changed in degree. We fail to perceive that now the question is quite often of changes of kind--which by themselves make the reference base we had painstakingly built up in preceding centuries thoroughly unusable. Moreover, real mutations in key elements or relationships now affect and threaten the functioning of the complex and delicate systems on which Life on Earth depends. In the face of such metamorphic changes, we must realize, no measure of old correctives can redress the situation.

3. To survive and progress in the age of technology we must, therefore, quickly awaken to its realities. To start with, a 'prise de conscience' has to be created of the velocity and radicality of the transformations now occurring in human society and its environment. The next step is to train our



perception and thinking to identify, comprehend and correlate the new kind of situations which have emerged and now dominate the world system, and to grasp their interactions and trends.

Only by a qualitative jump of this sort can we hope to acquire the forward posture needed to understand where our escalation in tampering with Nature's cycles and equilibria, and the unprecedented dynamic and artificialness we have impressed on everything which bears on our life, may finally lead us-- as individuals and collectivities, as mankind in the whole, even as a species among other species.

The Club of Rome is well aware how extremely difficult it is to place at this high level our understanding of the present complexities and of the futures which may stem from them. But it is equally convinced, as already mentioned, that a supreme effort must be made in this sense while still in time, namely during the next three or four or five years, if we want to steer our course toward safety and fulfilment--as is our vital interest and befits our quality of rational and spiritual beings.

4. The Club of Rome believes that it can be instrumental in catalyzing this exceptional effort. And to pursue this objective its activity during the first phase will be mainly centered around a project designed by Hasan Ozbekhan and the first draft of which has been circulated. In view of the

situation, we call it 'The Predicament of Mankind'. Its aim is to search into the wonderful and terrific reality which surrounds us, with the purpose of apprehending its morphology and dynamic, and thereby establishing new intellectual and operational bases on which to build for the years and decades ahead.

It is an ambitious undertaking--hence rather costly. The financial problem of The Club of Rome is essentially how to fund this Project. We have been in contact with many possible sources of financing, essentially private. To one of them we have specifically applied for the total or a large part of the sum required to carry out the Project. So far, an initial grant has been approved to complete its preparation and presentation and thoroughly scrutinize its feasibility--after which a decision will be taken. Other sources of financing we want to involve may be complementary or alternative to this one, or may support the general activity of the Club.

The scope, outline and terms of reference of this Project will be discussed in a while. I will limit myself to saying here that no comparable endeavor has ever been envisaged although, henceforth, a whole stream of activities must be organized along the general lines we propose--lest by piling of crisis upon crisis our course becomes without issue. I wish to add that we believe that the Project is feasible, in the sense that, though of course not unveiling the whole of reality or detecting all its workings, it will probably open a new way through which further, massive efforts can be directed to obtain the



elements and insight needed finally to gain control of our future. And therefore we are also confident that the problem of funds, albeit difficult, will not block this initiative.

5. However convinced we are that the Project will prove to be a clarificatory and decisive turning-point, it would be too naive to believe that its findings will easily be accepted. Therefore, while carrying it out, The Club of Rome should step up its general activity aimed at strengthening the sense of responsibility with the world decision centers, and focusing attention and increasing awareness of selected categories of public opinion--such as youth movements and what may be called 'intermediate groupings'--on the need for new roads to be charted.

The immediate aim of this collateral action is to get people's minds away from the traditional approaches which were germane to the simpler, discrete problems of the past, but which will now be totally unavailing, as we have just seen; and to sensitize them to the imperatives dictated by the new situation. However necessary, this may be considered a Herculean, nearly impossible task. Probably it is the most difficult task ahead because, though the situation is itself extremely complicated and baffling, the message should be as simple and intelligible as possible. Let me take a few minutes to consider this aspect of our future activity.

6. What has to be put through in different and opportune ways is the system concept, namely that the problems of modern society are so interlocked in metabolic interdependence that none of them can any longer be tackled on its own merits alone, but all have to be approached within a larger context. This will lead to the other and more fundamental concept that some of the major problems of our time are becoming so large as literally to span over the planet, and so overwhelming as to foreshadow the destiny of all peoples. And a corollary is that our main policies must now be futures-inspired, outcome-oriented. As a matter of fact, it has to be explained, things have reached a point where any success we may have with even very important problems of a national, continental or sectoral character, is irrelevant unless we are winning our battle also with these macroproblems of the world.

At first sight, these concepts are so heterodox that the Copernican change they would require; or intend to provoke, in our vision of human interests--from sectoral to systemic, from local to global, and from short-term to long-term and normative--may seem utopian. However, I am not so pessimistic, because of the widespread, though still confused, feeling even ordinary people have in every country that to-day's world is possessed by something fundamentally new and ominous, and that our conduct must change. And thus I believe that the imperatives of our time at which I just hinted can in fact be put convincingly through to large sections of world opinion--if we only want. And that they may be presented, for instance, as follows:



- = the imperative of a systemic approach: in a situation where everything interferes with everything else, problems are not only individually complex but mutually impinging through innumerable ramifications and overlappings--so that we are going around in vicious circles and courting disaster unless we first understand the dynamic interdependencies characterizing their ensemble;
- = the imperative of a global approach: in a world shrunk by technological progress to incredibly reduced dimensions, hereafter the major problems of any nation or people, if unattended, will boomerang on all others--so that no nation or people can totally separate its welfare, progress or destiny from the others', and a new solidarity of interests is forced on one and all;
- = the imperative of a normative approach: in an age when technology gives man the enormous powers to prod the cosmos and the atom, to go farther quicker, to produce more cheaper, to release unheard-of energies, to hoard fantastic wealth and knowledge, and to overkill foe and kin, the time is over for expediency and improvisation as they can only foreclose tomorrow's options and lead us astray--so that long-range objectives and planning must now guide things human.

7. Finally, it would be simply foolish not to consider the limited nature of The Club of Rome's means--even if we had all the financing requested--and its capacity to influence the views of the

people we want to address. This sobering thought is always with The Club of Rome, but we think that there exist already abundant ferments and trends, particularly among the young, for a catalyst to have an immense influence. The Club of Rome intends to contribute to fulfilling this function alongside or in combination with what I have called the 'intermediate groupings'.

There are, not only in Western society, a multitude of important think-tanks, study groups, intellectual circles, scientific bodies, centers of excellence, research institutes, plus foundations, academies, universities and industrial associations, unions, etc., of all sorts, having a sectoral or national or regional scope, but whose activity will be immensely enhanced and enlightened if that scope is placed--as it should be, and as proposed by The Club of Rome--within a wider context dictated by modern realities whose critical parameters are global, long-term and systemic. These groupings often forge innovation and, as they are para-establishment in essence, they may also act as transmission pulleys to set decision centers in motion.

They are of the most varied species, from the Atlantic Institute to the Fondation Européenne de la Culture, from the National Industrial Conference Board to the World Council of Churches, from l'Institut de la Vie to the World Society for Ekistics, from the Max Planck Gesellschaft to the Istituto Affari Internazionali, from the Association Internationale des Futuribles to the Overseas Development Council, from the



International Association for Cultural Freedom to the Science of Science Foundation. This list could be extended for pages, but, of course, The Club of Rome cannot reach all of them. However, the vehicles for the quick propagation of ideas across national and cultural frontiers are nowadays so developed that if The Club of Rome can produce some 'idées-force', they will find in this innumerable proliferation of groupings an invaluable multiplier for their diffusion.

8. But the ultimate aim of The Club of Rome is to reach and, if I may say so, to enlighten and motivate the main decision centers of the world. Some preparatory activity has already been carried out during the last year, chiefly by a number of visits to key people in Ottawa, Moscow, Washington, Tokyo, Buenos Aires, Vienna and other capitals. Our stand and purpose aroused interest because they tend to produce a more rational and constructive alternative to the present policies and policy-making methods. As we all know, in many quarters these are considered largely 'passé' and sterile. But our action, to be effective, certainly has to be sharpened and expanded.

I am also glad to state that we have been able to discuss our ideals and projects with the leaders of some international organizations, particularly the UN Economic and Social Council (ECOSOC) and the Organization for Economic Co-operation and Development (OECD), and that we were extremely gratified by their deep interest in the outcome of our

work and the promise of moral and technical support.

9. While our main task in the next few weeks and months will be to bring 'The Predicament of Mankind' Project to the implementation stage, and then to make a first-class job of its development, we intend also to maintain our contacts with people responsible for policy decisions in relevant centers both in national Governments and international organizations. And we have sincerely welcomed and deeply appreciated the initiative of the Swiss Federal Council in inviting us to come to Berne and present, for the first time in a coordinated way, the 'raison d'être' and the purpose of The Club of Rome. We detect in this invitation a sign of concern by the Swiss authorities about the adverse trends in human affairs and a desire to take a stand toward reversing them by giving moral acknowledgement to the effort The Club of Rome is trying to develop.

We want to say here that we are deeply grateful for this attitude of the Swiss Federal Council and Administration, and hope that--also due to the fact that our Association is based in this country--the Conference we are holding to-day in Berne may be just the first manifestation of support and advice this country is ready to give to The Club of Rome during the crucial years to come--thus setting an example which other countries may follow.



CLUB OF ROME CONFERENCE

Bern, 29-30 June 1970

THE FRAMEWORK FOR THE PROJECT IN SWITZERLAND

Natural sciences, as we know, have developed very rapidly. Every 15 years the number of scientists doubles, and so does the number of their publications. The leading industrial countries have not only contributed to furthering scientific knowledge, but have developed technology leading to enormous industries. Switzerland is one of the highly industrialised countries and its contribution to scientific knowledge and to the development of industrial products is important in comparison to its small size.

The gap between Science and Institutions

Science and technology are responsible for a high standard of living, but at the same time they are the cause of many critical world problems. The scientist lives in a kind of euphoria, convinced that he can solve any problem provided he has enough time and money. The latest Apollo missions have emphasized this fact. Humanity, however, is reacting violently to such a development, and in spite of increased knowledge we are witnessing a very severe crisis. The problems created by scientific progress seem to become more and more complex in nature, and we appear helpless to find solutions, even with our best scientific brains.

We have learned to solve problems with the tools of the natural sciences; however, today's problems seem to be immune to such an approach. All our attention has been concentrated on technical inventions and innovations, and institutional innovation has not been encouraged. On the contrary, most of our efforts have been devoted to maintaining out-dated institutions.



Because of this apparent inability to use science to solve or avoid critical world problems, confidence in science has been "lost". The scientist is accused of undertaking scientific work for the sake of science and because during the past 20 years he has had almost unlimited financial support from society.

#### The new problem

Natural sciences have helped in the understanding of basic phenomena. Fundamental laws have been discovered, laws which can be checked and measured accurately. The critical world problems apparent today cannot be measured by the scale of the exact sciences. The basic laws are not known, and the complexity of problems touching the behaviour of the human being are such that common rational thinking seems powerless. We may define the knowledge we would need as the soft sciences. However, the stake is so vital that even a very modest trial would be worth while in order to improve our understanding of the problematique.

The project described by Mr. Ozbekhan is a possible but unusual way of investigation and the fruits of a serious effort in this connection would seem to be promising.

#### The project

A research project such as that presented by Mr. Ozbekhan always appears vague in its early stages. As director of a research institute I think that this is not unusual. In most cases an idea or a question is vague at the origin of the project. It is a very difficult task to reduce it to a project capable of describing a specific approach which looks possible. Such analyses are necessary when we have to define how many people, what kind of people, what time and how much money are involved. A proposal has been worked out in order to realise what kind of organisation is necessary to do excellent work. The execution of research projects, especially the type in question, is very difficult because of its exploratory nature. It is not a matter of finding an answer to a very specific question but to an extremely complex



situation. The essential key is the research staff involved. Deep personal involvement is necessary as well as the tools for managing such an undertaking.

As the project is conceived as a single trial over a very limited period of time, it would not be advisable to form an institution for this purpose. It was therefore suggested that an ad hoc group of scientists be set up and incorporated into an existing research institution. The project will need the help of many consultants in different parts of the world and the staff for the project has to be composed very internationally.

The BATTELLE INSTITUTE in Geneva is prepared for such an assistance, as the permanent staff is composed of many nationalities and is experienced in many international research projects.

As the creed of the Battelle-Foundation is based on furthering science and its application for the benefit of mankind, the present project falls within its broad interests. It is therefore certain that the Club of Rome task force appointed to direct and execute the project finds a very receptive and natural surrounding.

The infrastructure of the Institute, i.e. its library, staff department, language department, publishing department, telecommunications, etc., can be made available within the contractual mechanism of the institute. Battelle should provide for all the necessary help as well as some specialists and supporting instruments. The Battelle laboratories in Geneva will be the supporting structure but the responsibility for conducting the project lies with the Club of Rome. The Institute has today a staff of about 700 people, of which 100 are already active in the soft sciences. Some of the scientists are very concerned with the subject of the project and the mathematical means already available may become an important tool for the work.

We have proposed that the project be undertaken in Geneva, not only because of the Battelle facilities, but because of the ideal situation of Geneva for international work and the easy link to other international organisations whose activities are pertinent to the project.

To be a success the Project needs a suitable platform, that is Switzerland as a neutral unengaged island. There are not many such places in the world. We are very honored, and I am personally very indebted to our "Conseil Fédéral", in particular to M. Celio who has reacted enthusiastically to such an undertaking.

In the past, Switzerland has supported many new ideas, like the Red Cross, for example. I hope that the effort and support given to the approach of the Club of Rome will open new ways in the tradition of our small country.



CLUB OF ROME CONFERENCE

Bern, June 29 and 30, 1970

What is being done to meet the situation

The rising crisis in human affairs which has been described by Professor Freymond is only now beginning to be appreciated in its entirety by politicians and the public at large. Many of its elements have, of course been recognised for some years and have, as in the case of the population explosion, pollution, delinquency, drug taking and the student unrest, already become political and social issues. As far as I am aware, however, no government has yet attempted to relate these phenomena or has perceived clearly that individually they are but symptoms of a disease which has become generalised within the social organism. There has been no serious attempt to analyse and diagnose in a coherent sense or to assess the possible impact of present trends on the body politic or on society as a whole.

The nearest formal attempt to present a total picture of the situation was made by Professor Thorkil Kristensen in February 1969 when, as Secretary-General of the O.E.C.D., he presented to his Ministerial Council a statement on "the problems of the modern society" particularly in the context of conditions of rapid economic growth. This evoked a spontaneous response from the Ministers of many countries and it was agreed that continuing growth and increased prosperity could well aggravate the modern society problems unless steps were taken to modify the



means, and particularly the technological developments on what growth depends and to consider more carefully the way in which the products of growth could better contribute to the advancement of society.

O.E.C.D. has continued its analyses of these problems giving particular stress to those of the environment. It has become increasingly clear that the origin of the new cluster of problems is to be found in three inter-related causes, namely rapid population growth and its increasing concentration in large aggregates; unprecedented levels of prosperity in the industrialised countries, despite residual islands of poverty and underprivilege and finally a rapid and uncontrolled technological development on which prosperity has been based but which has provided many undesirable side effects.

Meanwhile the individual problems of race, social unrest, pollution and student unrest have become ever more pressing, in most countries. In the United States, for example, concern about environmental pollution has reached a level of hysteria. President Nixon, in addition to initiating action programmes for the United States called upon the Atlantic Council to take up the challenge of the problems of modern society with the result that NATO has created a committee for the purpose and has organised a series of important national case studies, especially in pollution problems of inland and coastal waters, the air etc. and also on disaster control.

O.E.C.D. has, over a period of years developed a modest but practical programme in technological and resource management aspects of the air and water systems as well as undertaking studies on pesticides, noise pollution (including the sonic



boom), urban management and new transportation technology. This work will now be given greater importance and extended within the economic context which is the characteristic of this Organisation with special emphasis on cost-benefit and cost effectiveness studies of alternative means of controlling pollution, including the problem of who should pay -- government, industry or consumer, a problem which involves competitive aspects of international trade.

Meanwhile the OECD Ministers, at their meeting of May 1970, have pronounced on the economic growth prospects for the decade of the 1970's. The target of 50 per cent growth of G.N.P. for the OECD Member countries for the 1960's was exceeded in practice and, if Japan, which was not a member when the objective was set, is included, it was greatly exceeded. In view of the potentialities of the various countries for further growth the Ministers "set an increase in the real national product of the OECD area as a whole, of the order of 65 per cent as a collective growth objective for the decade 1970-1980". This is regarded as a framework within which "Member countries will determine their economic policies". The Ministers stressed, however, that "growth is not an end in itself but rather an instrument for creating better conditions of life" -- a statement of considerable political weight. "Increased attention" -- they said -- "must be given to qualitative aspects of growth and to the formulation of policies with respect to the broad economic and social choices involved in the allocation of growing resources".

The international bandwagon of the environment is by no means restricted to the Organisations mentioned above. The Council of Europe, for example, which has for many years interested itself in pollution and ecological problems, held an important



meeting on the subject earlier this year in the presence of many princes of the European Royal Houses. The Economic Commission for Europe of the United Nations is equally concerned and provides a forum for East-West discussion of these problems; it will hold an important conference on the environment in Prague during 1971. The European Communities of Brussels are likewise considering these questions from a more directly operational point of view within the scope of the "Aigrain Committee". UNESCO with its cultural and research preoccupations held a world conference on the biosphere in 1969, while the U.N. itself is organising a world conference on the environment which will be held in Stockholm in 1972.

Apart from these intergovernmental approaches, a large number of unofficial bodies have begun to take an interest in the modern society problems and, being free from the sectoral and bureaucratic constraints of the intergovernmental organisations are able to take a broader and more comprehensive view, but lack of course the means for action. They possess a limited degree of influence but have an extremely important function of public education and the opportunity for deeper intellectual penetration of the complex of problems. We can only list here a few of the more important private actions undertaken or envisaged. There are doubtless many more, in fact I am at present receiving invitations to participate in meetings of this type at the rate of four to five per week. In particular a number of significant démarches are at present being made in the United States, for example as a follow up of the work of the President's group on national goals, which are not fully known in Europe.

The following should be noted: the symposium held by the Nobel Foundation in October 1969; the New York Conference of the



World Academy of Arts and Sciences in April 1970 on "Environment and Society"; the Aspen conference of the International Association for Cultural Freedom on technology, social goals and cultural options to be held in August 1970. All these meetings have had an integrative and comprehensive approach to the problematique. On the environment again, the Battelle Institute is organising an important conference in Washington in January 1971 where the place of industry will be particularly stressed, and this will be followed by a conference in Europe on the same theme later in that year. The International Chamber of Commerce is also working in the same direction.

To sum up, there is a large and growing concern for this whole problem area. The private and professional initiatives are useful, encouraging comprehensive discussion but have, so far, had quite minor influence; the intergovernmental activity is large and probably excessively concentrated on the specific problems of pollution of the environment - so far mainly by talk rather than action. While there is a growing awareness on the part of many politicians that pollution is but one facet of the cluster of societal problems, they are in fact focussing on this aspect since it involves the least degree of social complexity and controversy. Pollution is an inorganic enemy which does not fight back in social and political terms; it is on the whole politically unifying and a useful diversion from still more serious and difficult matters.

In the meantime, public opinion, initially through students, radical groups and intellectuals but increasingly throughout the spectrum of society, is becoming deeply concerned with the human condition as it is emerging and with the inadequacy of existing structures, political systems and power groupings to face up to an uncomfortable reality. This takes many extreme



and even absurd forms - demands for an excessive conservationism, for a moratorium on scientific research for the acceptance of a zero-growth economy. The latter concept can be very dangerous - it would remove the possibility of abolishing the residuum of poverty in industrialised societies except through a revolutionary redistribution of income and abandonment of the present basis of society. In the tiers monde it could only be seen as a decadent post-colonialist abdication of responsibility by the rich nations of the world.

The predicament is deep. Man has shown that through technology he can free himself from poverty but has at the same time demonstrated his incapacity to manage himself, his societies and his future. He has made evident his capacity to create the weapons and conditions for the suicide of the race, not only through the bomb but through general incapacity to manage affluence and through the new potentialities provided by molecular biology and neuro-physiology to manipulate his organism and psyche-means, as is always true in science, which are capable of the greatest good and the greatest evil. The normal processes of organic evolution are too slow to take man further in the time he disposes. His fate and future are in his own hands, but he is aware of his lack of wisdom in contrast to his cleverness in material invention. The only ethic which remains to guide society and the individual is that which distinguishes policies and actions which favour human survival from those which lead to destruction.

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19th June, 1970.



WHAT IS THE CLUB OF ROME

The Club of Rome is an informal, multinational, non-political group of scientists, economists, planners, educators and business leaders -- a maximum of about 60 members. It is non-political in the sense that its members are not involved in current political decisions, and that it has not itself any ideological or national political commitments. Its vocation is the good of mankind, which in its opinion means also the good of any nation or people in a world which is rapidly emerging as a whole, integrated system. It believes that a rethinking, rediscovery and reformulation of values consonant with the realities of our time is needed; that broad goals for society must be defined; that a new set of institutions and instrumentalities is required to conduct human affairs adequately; and that to organize world society at a higher level the exceptionally dynamic present and the kind of futures that may eventuate from it must be first understood.

"THE PREDICAMENT OF MANKIND" PROJECT

To carry out its design, The Club of Rome has been incorporated in Geneva as a non-profit private association under the Swiss Civil Code and intends to develop actions in various directions. So far, it has established a number of contacts with key people in Ottawa, Moscow, Washington, Tokyo, Buenos Aires, Stockholm, Berne, Vienna and other capitals, as well as in international organizations. While this high-level exchange of views will continue, The Club of Rome believes that it can mobilize enough effort to undertake a project that, outstripping conventional wisdom and methodological orthodoxy, will succeed in penetrating and describing the complex nature and dimensions of the world problematique. If this goal is attained, the stage will be set for the formulation and development of long-term alternatives.



outlooks and options needed by those who are responsible for leadership and action in a world which must find a new, more promising course.

It is hoped that this Project -- tentatively called "The Predicament of Mankind" -- may start after the summer of 1970 and be completed by the end of 1971. It is conceived as a self-contained, non-continual operation, a kind of detonator of other and more broadly-based studies, of more advanced approximations to reality and of simulation models to be carried out subsequently by the joint initiative of the "advanced" nations. Its scope may appear both ambitious and immense, even if limited, as it is, to the three following points:

1. To examine, as systematically as possible, the nature and configuration of the profound imbalances that define today's problematique throughout the world; and to attempt to determine the dynamics of the interactions which seemingly exacerbate the situation as a whole.
2. To develop an initial, coarse-grain "model" or models of this dynamic situation in the expectation that they will reveal both those systemic components that are most critical and those interactions that are most generally dangerous for the future.
3. To construct a "normative" overview from these models; and to clarify the political, social, economic, technological, institutional, etc. consequences and the action implications that such an overview might entail and substantiate.



FIRST CLUB OF ROME CONFERENCE

BERN, 29 and 30 June 1970

By invitation of the Swiss Federal Council the Club of Rome will hold its first conference at Bern on the 29th and 30th of June.

About forty people will participate, coming from various countries in Europe, North and South America, Asia and Africa.

The Club of Rome was founded in 1968 at a meeting in Rome of some thirty people who set out to contribute towards a better understanding of the problems of modern society as a whole, seen in its global context. The Club of Rome aims at promoting a better analysis of the dynamics, interdependence, interactions and overlaps of the problems that characterize this whole, while concentrating particularly on those aspects that concern all mankind.

The results of the Club of Rome's studies and activities will be made known to public opinion in scientific, intellectual and political circles, and to decision centres at all levels, so as to influence world affairs as much as possible along more rational and humane lines.

More specifically, the members of the group promoting the Club of Rome have worked out a research project - The Predicament of Mankind - which will be undertaken in Switzerland with non-governmental financial backing. This particular project will be carried out at the Battelle Institute, Geneva, by researchers from various countries and research institutes, under the general management of Professor Hasan Ozbekhan.

The meeting of the 29th and 30th June 1970 will therefore be of primary importance to the start and practical development of the mission the members of the Club of Rome have taken on themselves. Its main aim will be to analyze and approve the method and organization of work on the project "The Predicament of Mankind", and to determine the Club of Rome's future programme.



# Problems of World Future

AURELIO PECCEI

## Human Society's Difficult Moment

Malaise and tensions are mounting throughout the world. Even affluent and strong societies show symptoms of a deep-seated uneasiness amidst uncontested economic and technical progress. Violence has become a way of life and death when things get too complicated. Quick bloody clashes flare up almost everywhere, and nobody knows if larger confrontations are lurking just around the corner.

Many signs indicate that we are nearing critical crossroads. "The contemporary unrest, although less apocalyptic than the two world wars which spawned it, is even more profoundly revolutionary in nature. The essence of a revolution is that it appears to contemporaries as a series of more or less unrelated upheavals." (Henry A. Kissinger).

Also, concern about present difficulties and future dangers is growing. This state of mind is witnessed by the flow of warnings and admonitions coming from high moral and scientific authorities, resolutions voted by the United Nations, and endless conferences, books, and studies concerning this troubled situation.

However, it is a confused concern; and it does not really help cast any light on the reasons why suddenly human society's very foundations seem so precarious and its perspectives so uncertain.

Every year which passes is important. But the end of this decade is particularly important. It may mark a turning point. In an impressive speech on the longer-range problems confronting modern society and the quality of life in an automating world, President Nixon said (NATO anniversary, April 1969): "The industrial nations share no challenge

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more urgent than that of bringing 20th-century man and his environment to terms with one another, of making the world fit for man, and helping man learn how to remain in harmony with his rapidly changing world." And OECD—which indeed provides a more fitting framework than NATO to discuss this newest challenge—has just started a grand debate on the "Problems of Modern Society."

By all means, this is the crucial question to which all Governments and international organizations ought to give first priority during the next decade. For it has been discovered that economic growth is not enough, in itself, to satisfy the demands of contemporary society. Other needs have jumped to the forefront. Suffice it to consider the unsatisfied collective, and therefore more specifically social, needs in our embattled cities.

At the same time the gap between the rich and the poor of the earth is appalling. Abundance is the privilege of certain limited areas, while elsewhere abject poverty and hunger are the rule. And other, equally intolerable imbalances and divergencies, of a technological, educational, and psychological nature, divide classes, generations, peoples, and nations. All these fractures tend to grow, rather than diminish, as civilization spreads, and make society ever more unstable.

Thus, the unhealthy condition of our gap-ridden planet deteriorates year after year. At this juncture, one might be tempted to express some hope because apparently there is a certain awareness of what we are up against.

But the stark reality—beyond words and intentions—is that no rational, adequate effort is yet made to counter this continuous involution or to close the gaps which threaten human society.

However, what makes this state of affairs still worse globally is an even more fundamental chasm. It is seldom perceived, but it is at the roots of our crisis. It consists in the growing cleavage between the new kind of world we go on creating and our very capacity to understand its fantastic potential for good or for evil.

This is the central drama of our time. Nature and history show that systems incapable of adapting to changing conditions are doomed. A case in point is the complex system of human society under the impact of the technological revolution. Its future depends on whether the psychosocial organization painstakingly constructed through epochs so different from



the present one is in condition to weather this revolution and not be swept away by it.

Time for action is now, because problems become ever larger, more intricate, and interlocking. The tempo of change is quicker. If the last decade has been breathtaking, the next one will be even more so. And new orders of magnitude, in the dimensions, dynamics, complexities, and expectations we have to live with, most certainly lie ahead.

There must be no mistake: What the future has in store is a tidal wave of formidable problems that will dwarf those we are already unable to resolve now. Some of them will be—and already are—problems beyond the reach of any nation or continent and which necessitates global and coordinated attack. They may be called "Problems of the World Future," and it is on them that our attention must be mainly centered.

To sum up, a race is on between our capacity to innovate and our capacity to control innovation. The fable of the sorcerer's apprentice repeats itself, but in modern terms and crude reality, on a planetary scale.

While this storm is gathering, not only must we no longer put aside the alarming questions which weigh on the minds of all liberal spirits, but new values, goals, approaches, institutions, and mechanisms must be speedily invented to match this reckless pace of change. Until society is established again on strong moral and functional bases, consistent with this age, its progress and even its mere survival are in jeopardy.

The basic thinking with respect to these problems is that, although it is not yet clear which options are open, two main alternatives may be detected. One is that the world may just continue to drift along its present, potentially ruinous course, practically without control and without objectives. The other is that the most advanced parts of mankind will brace up and put to use their immense patrimony of knowledge, information, and means to mount a supreme effort to steer the world toward a fresh direction, and then guide its course in an intelligent manner. Clearly, this is the goal to be pursued.

All the reasons exposed point to the necessity that all civilized peoples be involved in this venture. While Europe, which no longer is a protagonist in the arena of power politics, may be its starting point, all valid energies must be enrolled. In fact, not only do the problems to be attacked overarch



the whole world, but their solution or nonsolution will affect all peoples and nations.

#### The Principles of a New Approach

The principles with which the problems of the world future will have to be faced must of necessity be profoundly innovative. The current, nationally egocentric, and predominantly military, or technological, or economic approach has failed to produce viable solutions to our main problems. It is quite evident that to attack the gigantic maze of problems looming ahead a drastic change of approach is necessary. It has to be a change of kind, not only a change in degree. And it must be based on a fuller, more truly scientific and humane conception of the complex systems in which man, society, nature, and technology interplay. Much research and meditation, and a great capacity for synthesis, of course, are required to delineate its supporting principles. But some seem obvious.

As already implied, no global design can be pursued when the advanced, industrial nations of the world are engaged in struggling with one another in the pursuit of conflicting, generally out-dated objectives. It would be even more foolish and desperate to imagine that the Atlantic nations can tackle the global problems of man and his environment single-handedly. However large their resources, they are far less than the critical mass required. However deep their human understanding, it is not widely recognized.

Only by the combined action of all advanced countries may the world be steered in the right direction. Thus, at this turn of history, this has become their collective and inescapable obligation. This principle is fundamental, its implications far-reaching. Above all it means that East and West must cooperate or succumb.

Another correlative principle reinforces this posture. From many aspects the destiny of the world has become indivisible. Mobility, communications, and interdependence have increased so much that today the traditional factor of geographical distance counts for little. In such a shrunken world, profound gaps and imbalances, can no longer exist, since in the end they would, in one way or another, cause it to explode.

Hence, the concept of the oneness of mankind is dawning as a premise to the survival of one and all. Gone forever is the time when the different



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human groups antagonizing each other could still find new territory and resources. Now all peoples, crammed as they are in a small space, must perforce widen their individual narrow circles of solidarity, progressively embracing all mankind. No people, not even the strongest nations can hope to separate their destiny from that of all other peoples and nations in the decades to come.

The conduct of human affairs must henceforth be guided by long-term objectives and the reconciliation of short-term policies with their long-term implications. Many reasons make this principle essential. The long view is now necessary because of the increasing speed at which events follow and influence each other (the so-called acceleration of history), and also because of the process toward gigantism which occurs in practically every dimension (the trend to the macroscopic). The combined effect creates a high degree of inertia and inflexibility in the hierarchy of systems which make up the present-day world.

Hence, it is long-term goals and normative thinking which must inspire our decision-making and the sense of our direction, even to the point of overriding short-term considerations. This is a hard to swallow necessity, especially for the political class, but it will be better understood when we will have upgraded our rudimentary forecasting and planning technology.

Still another principle is that problems of a complex and multivariant character can only yield to highly refined systems approach techniques. In our pluralistic, hectic societies, most of the relevant factors continuously interfere with one another, and practically every problem is linked with every other problem. This dynamic web of interactions acquires paramount importance in many systems, so that to examine questions in isolation, "on their own merits," out of context, as of old, may be grossly and dangerously misleading.

In all system problems of our time, the most delicate aspects are the human and social ones. These aspects are generally beyond the range of rationalization of the systems analysis and computational techniques derived from military and aerospace problem-solving. Hence, no hope can be entertained of coping with their complexity unless far more refined methodologies and techniques are developed.

*June 14, 1969*

July 8, 1970

TENTATIVE PROGRAM  
CLUB OF ROME CONFERENCE  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JULY 20-31, 1970

Monday, July 20

9:00 Welcome, outline of program, Jay W. Forrester  
9:30 Club of Rome objectives while at M.I.T., Aurelio Peccei  
10:00 M.I.T. historical perspective related to dynamics  
of social systems, Gordon S. Brown  
10:30 Coffee  
11:00 Basic concepts, levels, rates, system structure, Dennis Meadows  
12:00 Lunch  
1:30 Formulation of simple Malthus model, Gerald Barney  
2:30- Sub-groups put Malthus model on computer. Learn techniques  
5:00 of computer time-sharing usage and experience all phases of  
a simple system study.  
Evening Free, read

Tuesday, July 21

9:00 Sources of models, information, data, relation to mental  
models, sources of structure, Jay W. Forrester  
9:30 Extension of the Malthus model, Gerald Barney  
10:30 Coffee  
11:00 A model of generation of solid waste, Jorgen Randers  
12:00 Lunch  
1:30- Develop the World Model (population, pollution, food,  
5:00 natural resources), Jay W. Forrester  
Evening Dinner - Speaker to be announced later



Wednesday, July 22

- 9:00 Positive feedback, transition between positive and negative loops, growth, equilibrium, decay, Jay W. Forrester
- 9:30 Biological dynamics: insulin-glucose control, Richard Foster
- 10:30 Coffee
- 11:00 Crisis of the Cities, John F. Collins
- 12:00 Lunch
- 1:30- Subgroups work with World Model  
5:00
- Evening Reading assignments

Thursday, July 23

- 9:00 Urban Dynamics, Jay W. Forrester
- 10:30 Coffee
- 11:00 Urban Dynamics, (cont.)
- 12:00 Lunch
- 1:30 Urban Dynamics, (cont.)
- Evening Dinner: Meet M.I.T. faculty members

Friday, July 24

- 9:00 System similarities, common structures, continuity of past to future, Jay W. Forrester
- 9:30 Model of Social Forces in Drug Addiction, Gilbert Levin and Edward B. Roberts
- 10:30 Coffee
- 11:00 Drug addiction, (cont.)
- 12:00 Lunch
- 1:30 Discussion of behavior of World Model.
- 2:30 Subgroups on World Model

Monday, July 27

- 9:00 Alternative policy formulation, Dennis Meadows  
9:30 Corporate Growth model, Jay W. Forrester  
10:30 Coffee  
11:00 Corporate Growth, (cont.)  
12:00 Lunch  
1:30 Club of Rome Executive Committee, preliminary discussion  
of Predicament of Mankind Project.  
Other members: free, reading, staff and computer available.  
Evening Dinner - M.I.T faculty guests, or alternate for July 28  
reception

Tuesday, July 28

- 9:00 Skills and Training needed for social systems dynamics,  
Jay W. Forrester  
9:30 Dynamics of Commodity Stabilization, Dennis Meadows  
10:30 Coffee  
11:00 Commodities, (cont.)  
12:00 Lunch  
1:30 Sub-groups, work with model of commodity stabilization  
policies.  
Evening Reception, Howard Johnson, President of M.I.T., tentative

Wednesday, July 29

- 9:00 Modeling of social systems, Jay W. Forrester  
9:30 Professional literature and sources of information,  
Richard Foster  
10:30 Coffee  
11:00 Dynamics of Land Use and Food Production, Gerald Barney  
12:00 Lunch  
1:30 Club of Rome Executive Committee on Project planning.  
Other members: free, reading, staff and computer available.  
Evening Free, reading



Thursday, July 30

- 9:00 Modeling of social systems, Jay W. Forrester  
9:30 Designing a System for Comprehensive Community Health  
Care, Edward B. Roberts  
10:30 Coffee  
11:00 The Urban Dynamics Research Program, Walter Schroeder  
12:00 Lunch  
1:30 Group discussion of social trends led by Jay W. Forrester  
based on readings to be supplied from Kuhn, McGregor, Hagen.  
Evening Alternate time for July 28 reception

Friday, July 31

- 9:00 Characteristics of complex social systems, Jay W. Forrester  
10:30 Coffee  
11:00 Implementing new policies in social systems, Dennis Meadows  
12:00 Lunch  
1:30 Final discussion  
3:00 Executive Committee on future plans

Saturday, August 1

Reserve for Executive Committee on future plans

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CLUB DE ROME DU 30 JUIN 1970, HOTEL BELLEVUE PALACE A BERNE

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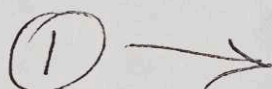
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NOTE: Other candidates have already been considered  
at Club meetings. Selection and cooptation of  
a number of them is presently under way.